

OPERATORS TRAINING GUIDE

MODEL 3301

AUTOMATIC DATA PROCESSING OFFICE

JANUARY 1969

REVISION 2 (16)

RCA 3301

OPERATORS' GUIDE

CONTENTS

The following pages have been revised in the Guide:

<u>Page</u>	<u>Reason for Change</u>
II-12A	Variable Data added.
IV-1A	Process ID corrected.
IV-19, IV-21, IV-23	Publication reference added.
IV-26	Typeouts added.
IV-27	Publication reference added.
IV-37	Note corrected.
IV-44, IV-49, IV-50, IV-52, IV-54	Publication reference added.
IV-55	Typeout changed.
IV-58	Publication reference added.
IV-66	NOTE verb - Remarks changed.
IV-76	Publication reference added.
IV-77, IV-85	Note added, logical device number updated.
IV-86	3488 typeout added.
IV-90	Publication reference added.
IV-102	Segment number changed.
IV-105	Publication reference added.
IV-110	Specifications changed.
IV-145, -149, -154, -156, -158	Publication reference added.

94-16-001-11

94-16-001-2

June 1967

Rev. to
3RD PRINTING

REVISION (Cont'd)

DISPOSITION

Replace the pages affected by this revision with those attached.

NOTE

The updated information contained in this revision is keyed in the margin area of the page to indicate the type of change:

Ⓐ - Addition Ⓒ - Change Ⓓ - Deletion

REVISION 1
RCA 3301
OPERATORS' GUIDE

CONTENTS

Revised Information

The following pages have been revised:

<u>Page</u>	<u>Reason for Change</u>
II-10	Message added.
II-16	Messages added.
IV-1	Service Routine Index added.
IV-13	Assembly typeout added.
IV-37 thru IV-41	SMSYS changed to RSSMS.
IV-43A, B, C	Typeouts added.
IV-43C, D, E, G-1, H	SMSYS changed to RSSMS.
IV-66	Out-of-sequence check option added.
IV-70A	Typeout added.
IV-72C	Editing change.
IV-82, IV-85	Device assignments changed.
IV-111, IV-111A	Complete replacement.
IV-112	Card columns changed.
IV-113, IV-157	Meanings added to typeouts.
L-11	DUMP option expanded.
Appendix N	Complete replacement.

New Information

Appendix P - 3301/1401 STACK has been added to the manual.

DISPOSITION

Replace the Title Sheet and Table of Contents in the manual.

Replace the pages superseded by this revision with those attached.

Insert Appendix P.

94-16-001-10

94-16-001-1

March 1967

3RD PRINTING

NOTE

The updated information contained in this revision is keyed in the margin area of the page to indicate the type of change:

- Ⓐ - Addition
- Ⓒ - Change
- Ⓓ - Deletion

REVISION 9 (14)

RCA 3301

OPERATORS' GUIDE

CONTENTS

The following pages have been revised in the manual:

<u>Page</u>	<u>Reason for Change</u>
IV-11 thru IV-13A	Assembly typeouts have been rearranged in sequence.
IV-65, IV-66	INFPAR format revised due to latest COBOL release.
IV-82, -83, -84	New version of 88CPY routine.
IV-86A	New version of 88REP routine.
IV-86D	Note removed.
IV-113	Error message added.
IV-144	Error message added.

DISPOSITION

Replace the pages superseded by this revision with the pages attached.

NOTE:

The updated information contained in this revision is keyed in the margin area of the page to indicate the type of change:

Ⓐ - Addition

Ⓒ - Change

Ⓓ - Deletion

94-16-001-9

November 1966

Revision 8 (13)

RCA 3301

Operators' Guide

CONTENTS

The following pages have been revised in the guide:

<u>Page</u>	<u>Reason for Change</u>
II-17	Error typeout added.
II-31	Error typeout added.
III-2	Call codes revised
III-4	Memory allocations changed
III-32	Format revised.
III-33	Format revised.
III-34	Format revised.
IV-87 thru IV-89	Deleted

DISPOSITION

Replace the Title Sheet and Table of Contents with those included in this revision.

Replace the pages updated by this revision with the pages attached.

Remove pages IV-87, IV-88, and IV-89, and replace with new page IV-87.

NOTE

Pages IV-93 and IV-94 have been reprinted to correct improper pagination.

94-16-001-8

September 1966

Revision 7 (12)

RCA 3301

OPERATORS GUIDE

CONTENTS

The following pages have been added or revised in this manual:

<u>Page</u>	<u>Change</u>
II-8	Code 110012 has been inserted into the table.
II-31B	Codes 1G0418 and 1G0419 have been inserted into the table.
L-1 thru L-13 inclusive.	These pages have been replaced by pages L-1 thru L-21 attached.

DISPOSITION

1. Replace the pages changed by this revision with the pages attached.
2. Add the new pages attached to this revision to the manual.

NOTE:

The updated information contained in this revision is keyed in the margin area of the page to indicate the type of change.

- Ⓐ - Addition
- Ⓒ - Change
- Ⓓ - Deletion

Revision 6 (11)

RCA 3301

Operators' Guide

CONTENTS

The following pages have been revised in the guide:

<u>Page</u>	<u>Reason for Change</u>
II-31E	Error message changed
III-3	Memory requirement increased
IV-41	Typeout revised
IV-43A	Typeout revised
IV-43B	Typeouts changed and deleted
IV-43C	Typeouts changed
IV-43E	Typeouts changed
IV-43F	Typeouts changed and added
IV-43G	Typeouts deleted and added
IV-43G-1	Typeouts added
IV-61	COPY and INCLUDE information changed and SORT verb information added
IV-67 thru IV-70A	Typeout information expanded
IV-72A	Typeouts added to section on Single Compilation
IV-72B thru IV-72H	Stacked Compilation page numbers changed
IV-72G	Stack Compile Restart added

DISPOSITION

Replace the pages superseded by this revision with pages attached.

NOTE

The updated information contained in this revision is keyed in the margin area of the page to indicate the type of change:

- Ⓐ - Addition
- Ⓒ - Change
- Ⓓ - Deletion

Revision 5 (10)

RCA 3301

Operators' Guide

CONTENTS

The following pages have been revised in the guide:

<u>Page</u>	<u>Reason for Change</u>
II-13	Meaning and action clarified
IV-94	Error typeout added

DISPOSITION

Replace the pages superseded by this revision with pages attached.

NOTE

The updated information contained in this revision is keyed in the margin area of the page to indicate the type of change:

- Ⓐ - Addition
- Ⓒ - Change
- Ⓓ - Deletion

JUNE 1966

Revision 4 (9)

RCA 3301

Operators' Guide

CONTENTS

The following pages have been revised in the guide:

<u>Page</u>	<u>Reason for Change</u>
II-16	Messages changed
II-32	Message added
V-6	Actions changed

DISPOSITION

Replace the pages superseded by this revision with the pages attached.

NOTE

The updated information contained in this revision is keyed in the margin area of the page to indicate the type of change:

- Ⓐ - Addition
- Ⓒ - Change
- Ⓓ - Deletion

MAY 1966

Revision 3 (8)

RCA 3301

Operators' Guide

CONTENTS

Revised Information

<u>Page</u>	<u>Reason for Change</u>
iv	Appendix 0 added.
II-2	Items 1-a and 1-a-1) revised.
III-2	Routine removed.
III-3	Note added and memory requirement changed.
III-18	Data Patch - changed.
IV-29-IV-30C	Process Generator (PRGN9) complete description changed.
IV-31-IV-36B	PRGN9 - typeouts revised.

New Information

Appendix 0 - Task Processing added.

DISPOSITION

Replace the pages superseded by this revision with the pages attached.

Insert Appendix 0 in the back of the guide.

NOTE:

The updated information contained in this revision is keyed in the margin area of the page to indicate the type of change.

- Ⓐ - Addition
- Ⓒ - Change
- Ⓓ - Deletion

142-4-8

94-16-001-3

APRIL 1966

Revision 2 (7)

RCA 3301

Operators' Guide

CONTENTS

The following pages have been revised in this guide:

<u>Page</u>	<u>Reason for Change</u>
II-2	Typewriter entry changed in item 2.
II-3	Action #4 changed.
II-5	Actions revised.
II-6	Meaning clarified.
II-7	Meanings and actions revised.
II-8	Message code added and action revised.
II-9	Meanings and actions revised.
II-10, II-11	Actions revised.
II-12, II-13	Meanings and actions revised.
II-14A	Meaning clarified.
II-14B, II-15	Actions revised.
II-16	Message code and actions changed.
II-30, II-31, II-31A, II-31B	Meanings revised.
II-31E	Message changed.
II-32	Meanings and actions revised.
IV-2	3301 Assembly specifications added.
IV-5 thru IV-8	References corrected.
IV-11	Message number changed and message deleted.
IV-12	Message deleted and Actions changed.

MARCH 1966

Revision 1*

RCA 3301

Operators' Guide

*The 3301 Operators' Guide has been reprinted to include Revisions 1 through 5. However, for manuals that have been updated when these revisions were issued, the attached revision will be Revision 6 (February 1966); for the reprinted version, this revision will be Revision 1 (February 1966).

CONTENTS

The following pages have been revised in this guide:

<u>Page</u>	<u>Reason for Change</u>
IV-13	Message Codes revised.
IV-39	Halt added.
IV-40	Meaning of Halt corrected.
IV-41	Halt added.
IV-43	Meaning of Halt revised.
IV-43B	Meaning and action of Halts revised.
IV-43C	Meaning and action of Halts revised.
IV-43D	Typeout revised, typeout added.
IV-43E	Halt added; Halt changed.
IV-43G	Two Halts added, two Halts changed, and one Halt deleted.
IV-43F	Halt changed; Halt added.
IV-43H	Halt changed; Halt added.
IV-61	Note added.
IV-70	Two Messages added.
IV-71	Three Messages added.
IV-72C	Remarks corrected for device #70.
IV-72D	E/D card corrected to ED card.
IV-72F	6. Stack Compile Restart Options Added.

FEBRUARY 1966

CONTENTS (Cont'd)

<u>Page</u>	<u>Reason for Change</u>
IV-72G	6. Restrictions changed to 7. Restrictions.
IV-86	Typeouts added.
IV-86A	88REP routine added.
IV-86B	Page no. changed from IV-86 to IV-86B.
IV-86C	Page no. changed from IV-86A to IV-86C.
IV-86D	Page no. changed from IV-86B to IV-86D.
IV-115	DEVPAR parameter changed.

DISPOSITION

Replace the pages superseded by this revision with the pages attached.

NOTE:

The updated information contained in this revision is keyed in the margin area of the page to indicate the type of change:

- Ⓐ - Addition
- Ⓑ - Change
- Ⓓ - Deletion

Revision 5

RCA 3301

Operators' Guide

CONTENTS

The following pages have been revised in this guide.

<u>Page</u>	<u>Reason for Change</u>
II-4	Message Codes revised.
II-9	Meaning expanded.
II-18	Action corrected.
II-22	Additional action has been added.
II-23	Actions revised.
II-27	Meanings and actions revised.
II-29	Message Meaning expanded.
II-36	Restarting information added.
III-3	Memory Allocation changed.
III-23	Option 2: A limitation was added.
III-25	Limitation added to Snapshot Print.
V-6	Message Codes & Meanings revised.

DISPOSITION

Replace the pages superseded by this revision with the pages attached.

NOTE:

The updated information contained in this revision is keyed in the margin area of the page to indicate the type of change:

- (A) - Addition
- (C) - Change
- (D) - Deletion

94-16-001-5

2nd printing
JANUARY 1966

Operators' Guide

CONTENTS

Revised Information

The following pages have been revised in the guide:

<u>Page</u>	<u>Reason for Change</u>
II-14B	Error message added
II-24	Error messages added
II-31B, II-31C, II-31D, II-31E	Error messages added
II-33	Type format added for Operating Systems generated from ES series Master Tapes.
III-3	Memory allocation changed
III-20	Note 3 added
III-31C	Typeout constant added
III-35	Restriction added
III-36	Output device added
IV-31	Typeout added
IV-35	Typeout added
IV-43E	Typeout added
IV-49A	Warning message added
IV-53	Typeout added
IV-58, IV-59	Typeouts revised
IV-61	Own Code information added
IV-62	Paragraph added
IV-65	Update and Copy/Include revised

CONTENTS (Cont'd)

<u>Page</u>	<u>Reason for Change</u>
IV-68	Typeout revised
IV-70	Typeouts CC7227 revised and CC8030 added.
IV-72B	Tape List changed to STC1
IV-72C	File-Names changed and Device Assignment paragraph revised.
IV-72E	Note added
IV-72F	Column 36 information added
IV-86, IV-86A	Typeouts completely replaced
IV-115, IV-116	Segment and sequence numbers changed
IV-141, IV-142, IV-143, IV-144	Messages completely replaced

New Information

The following routines have been added to section IV of the guide:

<u>Page</u>	<u>Routine Name</u>
IV-145	Process/Task Extract (PTEXT)
IV-149	3301 MLT-301 Program Copy routine (AD301)
IV-154	Calculate Drum Space (LCSSR)
IV-156	Process Transcriber (LPTSR)
IV-158	Drum To Tape Dump (LDTTD)

DISPOSITION

Insert the new Title Sheet and Table of Contents.

Replace the pages superseded by this revision with the pages attached.

Insert new routines in section IV.

REVISION 3

RCA 3301

OPERATORS' GUIDE

CONTENTS

The following revisions and additions have been made to the RCA 3301 Operators' Guide:

<u>Page</u>	<u>Reason for Change</u>
II-2, II-2A	New Process Execution procedures.
II-28	Error Message revised.
III-2	Console routines added
III-3	"Initiate" format revised.
III-6	"Terminate" format revised.
III-18	Data Patch paragraph revised.
III-31A	Console routine Suspend Process added.
III-31B	Write IBM Tape Mark - page number changed only.
III-31C	Console routine Display Available Devices added.
IV-10 thru IV-13,	Typeouts revised.
IV-13A	
IV-15	Error Messages replaced.
IV-99	An Error Halt was added.
L-8	Entries for columns 65-67 were changed.

DISPOSITION

Remove page IV-15A from the guide.
Insert the new Title Sheet supplied.
Replace the pages superseded by this revision with the pages attached.
Insert new Console routines in section III.

NOVEMBER 1965

REVISION 2

RCA 3301

OPERATORS' GUIDE

CONTENTS

The following revisions and additions have been made to the RCA 3301 Operators Guide.

<u>Page</u>	<u>Reason for Change</u>
II-1, II-2	Drum initiation added.
II-9	Message Code 111401 changed.
II-11 thru 11-14B	Additional message codes have been included in these pages.
II-31B	Message code DRUMBOOT added.
III-1	List of restricted process ID's added.
III-2, III-2A	Additional Console routines listed.
III-8	Note on 301 Compatibility.
III-31A	Console routine Write IBM Tape Mark.
III-35	Console routine Initiate Drum.
III-36	Console routine Drum Index Edit.
III-37	Console routine Drum Print.
III-38	Console routine Allocate Drum File.
III-39	Console routine Deallocate Drum File.
III-40	Console routine Rename Drum File.
IV-16 thru IV-18	Deleted.
IV-19	Specifications revised.
IV-20	Error Messages revised.
IV-21, IV-22	MLT Patch replacement pages.
IV-23 thru IV-26	Peripheral Device Duplicate routine replacement pages.
IV-27 thru IV-28A	PLT/MLT Merge replacement pages.
IV-29 thru IV-31	Process Generator replacement pages.

94-16-001-2

OCTOBER 1965

<u>Page</u>	<u>Reason for Change</u>
IV-34 thru IV-36	Message codes revised.
IV-37 thru IV-43, IV-43A thru IV-43F	Sort/Merge System replaces the entire SMSY3 section.
IV-46, IV-47	New Error Messages.
IV-48	Deleted.
IV-49, IV-49A	New Error Messages.
IV-50, IV-51	Unbatched Card-to-Tape replacement.
IV-52, IV-53	Variable Length Card-to-Tape replacement.
IV-54, IV-55	Revised Error Messages.
IV-62	Paragraph c) revised.
IV-72A	Note added in 1) Function.
IV-72C	Note added for Output, paragraph d).
IV-72D	Multifile paragraph revised.
IV-73 thru IV-75	New Error Messages.
IV-90, IV-90A	System Tape Generator (SYSGN) replacement pages.
IV-93 thru IV-94A	Message codes revised and added.
IV-105	Task Generator specifications changed.
IV-110 thru IV-114	Tape-to-Printer Punch routine added.
IV-115 thru IV-139	Tape File Maintenance routine added.
IV-140 thru IV-143	MLT Correct and Edit routine added.
V-3	Paragraph "e" added.
L-1 thru L-13	Complete replacement.
N-1 thru N-4	Appendix N - 3301/1401 Translators added.

DISPOSITION

Replace the Title Sheet and Table of Contents with those included in this revision.

Replace the pages updated by this revision with those attached.

Insert the new Console routines in section III.

Insert the new routines in section IV.

Insert Appendix N as the last Appendix in the book.

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RCA 3301

OPERATORS' GUIDE

REVISION 1

CONTENTS

The additions and corrections to the RCA 3301 Operators' Guide are contained in this revision. Specifically, these changes are:

<u>Page</u>	<u>Reason for Change</u>
II-5	Meaning for TYPE IN CHANGES message clarified for 3488 files.
II-7	Meaning for Message Code 019216 changed. Action for Message Code 019418 changed.
II-9	Message Codes 111202, 111402, and 115003 added.
II-10	Message Codes 117007 and 117008 added.
II-12	Message code 122408 changed.
II-28	Message code 1F0028 changed.
II-31	Message codes 1G0406 thru 1G0410 changed.
II-31A, II-31B	Message codes 1G0411 thru 1G0417 added.
II-33	Options R and T added under 2. Type.
III-3	Option T added.
IV-13	Message added at bottom of page.
IV-15	Message added at bottom of page.
IV-15A	Error Messages added.
IV-29 thru IV-36	Replacement pages for Process Generator (PRGN9).
IV-63	Logical Device Numbers changed.
IV-64	Under INFPAR, items 4 and 5 added. Item 4 changed to Item 6.
IV-67	Sub-Function Code 90 added.
IV-69	QMM118 Message replaced.

94-16-001-1

AUGUST 1965

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<u>Page</u>	<u>Result in Change</u>
IV-71	CPU139 Message added.
IV-72A thru IV-72G }	Added pages for 3301 COBOL Compiler (Stacked Compilation).
IV-73	Under 5. Parameters, publication reference changed.
IV-76	Normal and Error Typeouts changed.
IV-77	Under 2. Specifications, publication reference changed.
IV-78 IV-79 }	Normal and Error Typeouts for 3488 Magazine Initializer changed.
IV-80	Replaces pages IV-80 and IV-81.
IV-82	Under 2. Specifications, publication reference changed
	Under 5. Parameters, B8000 TYPE-IN PARAMETER changed to <u>B80101</u> . Under d., STOP changed to END.
IV-83 and IV-84 }	Replaces existing pages IV-83 and IV-84.
IV-86	Replace existing page IV-86.
IV-91	Under 3. Device Assignment, Logical Device No. 06 added; seg. No. 20 changed to 05; and Seq. No. 32 changed to 14.
IV-102 thru IV-104 }	3488 UTILIZATION REPORT ROUTINE replaced.
IV-105 thru IV-109 }	Task Generator (TSKGN) added to Section IV.
Appendix K	The new Appendix K, 20K 3301 Compatibility Operating System, replaces the existing Process Generator Parameters.

DISPOSITION

The attached pages outlined above are to replace portions of or are to be added to the 3301 Operators' Guide.

RCA 3301
OPERATORS' GUIDE

94-16-001

June 1967

The information contained herein is subject to change without notice. Revisions may be provided to advise of such additions and/or corrections.

First Printing: June, 1965
Second Printing: January, 1966
Third Printing: November, 1966

The following revisions were issued to the First Printing:

94-16-001-1 (August 1965)	} The Second Printing included these revisions.
94-16-001-2 (October 1965)	
94-16-001-3 (November 1965)	
94-16-001-4 (December 1965)	
94-16-001-5 (January 1966)	

The following revisions were issued to the Second Printing:

94-16-001-1 (February 1966)	} The Third Printing included these revisions.
94-16-001-2 (March 1966)	
94-16-001-3 (April 1966)	
94-16-001-4 (May 1966)	
94-16-001-5 (June 1966)	
94-16-001-6 (July 1966)	
94-16-001-7 (August 1966)	
94-16-001-8 (September 1966)	
94-16-001-9 (November 1966)	

The following revisions have been issued to the third printing:

94-16-001-1 (March 1967)
94-16-001-2 (June 1967)

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I. RCA 3301 CONSOLE

A. GENERAL DESCRIPTION

The RCA 3301 System Console consists of two consoles used for data processing operations; the Maintenance Console and the Operator's Console.

B. MAINTENANCE CONSOLE

The Maintenance Console contains various indicators that display and control machine registers and switch settings. The Maintenance Console is used by the maintenance engineer for the purpose of error investigation and hardware checkout. This portion of the console does not require operator intervention and, therefore, is not discussed with detail in this guide.

C. OPERATOR'S CONSOLE

The Operator's Console consists of the Console Typewriter and the Operating Panel - Switch/Indicators. When used with the Operating System and the standard operating procedures presented in this guide, the Operator's Console is the input-output communications device for 3301 system processing.

Console Typewriter

The Console Typewriter is an on-line device that provides direct input to and output from the Processor. The maximum output rate is 924 characters per minute. A maximum of 85 pica characters may be printed per line (10 characters per inch) on single-chart or multiple-sheet stock up to 11 inches wide. The Console Typewriter provides a documented copy of the operator's input - output operations.

The Console Typewriter consists of 44 keys that accommodate the printing of 63 characters. There are 26 upper-case alphabets, 10 numerics, and 27 special-print symbols printed by the Console Typewriter (see page I-5).

The Typewriter has several functional keys which may be operated manually:

- | | |
|-----------|---|
| Backspace | - When depressed, this key moves carriage back (to the left) one space or position. |
| Index | - When depressed, this key causes vertical paper movement of one line. |
| Return | - When depressed, this key causes the carriage to be returned. |

- Shift - The shift key causes the special characters shown in the upper portion of the double character keys (Figure I-1) to be sent to the processor when the respective key is depressed.
- Lock - When depressed, this key locks the typewriter in the shift position.
- Margin Release - When depressed, this key releases all margin stops.
- Clear Set - Used in conjunction with the Tab button to clear or set Tab stops.
- Tab - When depressed, this key causes the carriage to be moved to the right until the first tab stop is found. Tab stops are set with the depression of the set button.
- Space Bar - When depressed, this key causes an octal 12 to be sent to the processor. No characters will be printed.

Carriage Return is accomplished when A-B Equality is encountered when reading or writing to the Console Typewriter. Depression of the Cancel and/or Release buttons also causes the carriage to be returned.

Operating Panel - Switch/Indicators

The switches/indicators on the Operating Panel and their functions are as follows:

ALTERATION SWITCHES (BP1, BP2, BP3, BP4)

These four buttons are set and reset manually by the operator. These buttons may be interrogated by the CTC instruction. (See Decision and Control instructions of the Systems Reference Manual.)

REQUEST

When depressed by the operator, this button sets the Console Interrupt Indicator causing a program interrupt. When depressed, this button would indicate to the Operating System that the console requests action.

READY

When illuminated, this light indicates that a READ command to the Console Typewriter has been staticized. At this point, the operator may start entering data, perform console routines, or type in any information needed by the program.

CANCEL

When depressed, this button terminates the information being entered via the Console Typewriter. CANCEL causes an abnormal-termination condition to exist and, when used in conjunction with the RCA 3301 Operating System, causes the typewriter to carriage return and the READY light to be illuminated. Cancel is normally used when erroneous information is entered while typing information through the Console Typewriter.

RELEASE

When depressed, this button terminates the information being entered via the Console Typewriter. RELEASE causes a normal termination condition and, when used in conjunction with the RCA 3301 Operating System, causes the READY light to be extinguished, the typewriter to carriage return, and the instruction requesting console action to be terminated. RELEASE is depressed when the operator has successfully keyed in data in response to a console or program request.

ERROR

When illuminated, this light indicates the detection of a double-systems error or the detection of a read-parity error when using the Load Tape or Load Console functions. Processing stops when this button is illuminated.

LOAD TAPE

When depressed, this button causes the processor to execute a Read instruction; reading from Tape Station #6 into HSM location 0000. Upon successful termination of the read (caused by detection of a gap on tape), no interrupt indicators are set and control is transferred to HSM location 0000.

LOAD CONSOLE

When depressed, this button causes the processor to execute a Read instruction; reading from the Console Typewriter into HSM location 0000. Upon successful termination of the Read (caused by the Operator depressing the RELEASE button), no interrupt indicators are set and control is transferred to HSM location 0000.

PAPER LOW

When illuminated, this light indicates the Console Typewriter's paper supply has depleted.

GEN RES

When depressed, this button clears the Interrupt Registers, clears all conditions set by the Control Interrupt instruction, resets all error indicators including those in the control modules, and resets all registers not in micromagnetic memory.

STOP

When depressed, this button brings the processor to an orderly halt at the completion of the instruction being executed in the Normal Mode. The instructions being executed in the Simo Mode continue to completion. The P Register contents are stored in Register R of micromagnetic memory and this button is illuminated.

START

When depressed, this button causes the processor to start operation, with the execution of the instruction addressed by the P Register.

D. POWER CONTROLS

Located on the right-hand side of the console is a group of six buttons and indicators used to control power distribution to the processor. These buttons and indicators are as follows:

MASTER OFF

- This button is an emergency power-off switch, and when depressed, will immediately disconnect the load from the dc power supply and bypass the normal cycle-down procedures.

POWER ON

- When depressed, causes the processor to be cycled up (if the Master Off button is illuminated).

POWER OFF

- When depressed, causes the processor to be cycled down.

MARGINAL CHECK

- When illuminated, indicates that the processor is operating in the marginal check status.

OVERHEAT WARNING

- When illuminated, indicates that one of the processor racks is too hot for operation.

DC READY

- When illuminated, indicates power is ready and operation of the computer may begin.

SPECIAL PRINT SYMBOLS

DESCRIPTION	PRINTED SYMBOL	OCTAL VALUE
Number	#	13
At the Rate of	@	14
Open Parentheses	(	15
Close Parentheses	)	16
Error	e	17
Ampersand	&	20
Plus	+	32
Period	.	33
Semicolon	;	34
Colon	:	35
Apostrophe	'	36
Plus Zero	CR	37
Dash or Minus	-	40
End Information (E/I)	[	52
Dollar Sign	\$	53
Asterisk	*	54
End Data (E/D)	>	55
End File (E/F)	<	56
Subscript ₁₀	10	57
Quotation	"	60
Virgule	/	61
End Block (EB)	÷	72
Comma	,	73
Percent	%	74
Item Separator (ISS)	↑	75
Equals	=	76
Lozenge	◊	77

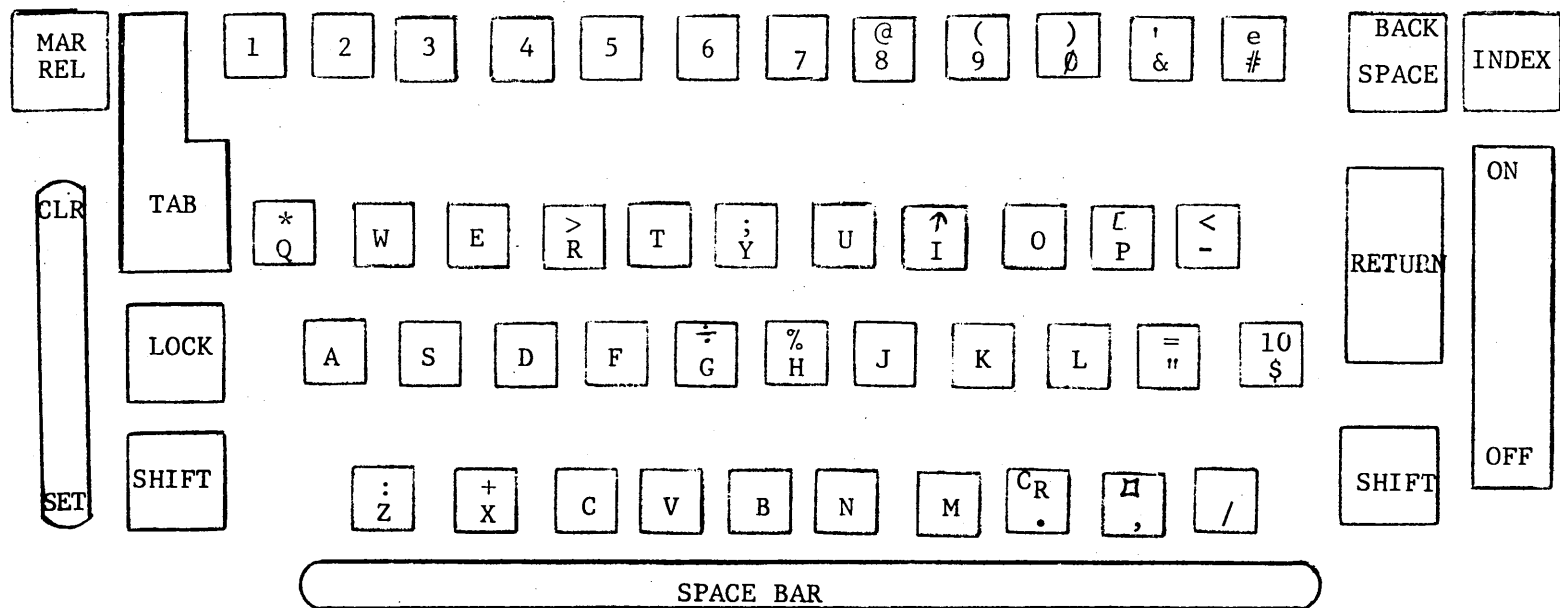


FIGURE I-1

CONSOLE TYPEWRITER KEYBOARD

II. SYSTEMS PROCEDURES

A. SYSTEM INITIATION

The following procedure must be followed in order to load the Operating System into memory:

1. Mount the Operating System Tape on trunk 6.
STOP GEN RES.
2. Depress the LOAD TAPE button.
3. A typeout will be executed to the Console Typewriter requesting the date:

typeout: DATE
response: MMDDYY X
 where MMDDYY = month, day, and year
 X = 1 if one-tape system
 2 if two-tape system
 D if Drum Operating System
 is to be transcribed to the drum.

After the response is typed, depress the RELEASE button.

4. The message %%%% will be typed, and the READY light will be illuminated.
5. The Operating System is loaded and, in the case of the drum operating system, it is written to drum. The operator may initiate a process, or do any of the Console routines.

B. LOADING OPERATING SYSTEM FROM OTHER THAN TRUNK 6

The following procedure may be used to load the Operating System when trunk 6 is not available:

1. Mount the Operating System Tape on any tape station.
2. Depress GEN RES then depress LOAD CONSOLE and type the following message:

4X000000280..

where X is the Operating System tape station.
Depress RELEASE. The first block will be read into memory.

3. Depress GEN RES then depress LOAD CONSOLE and type the following message:

V0X

where X is the Operating System tape station.
Depress RELEASE.

4. Message DATE will be typed. Follow System Initiation procedures starting at A.3. above.

C. LOADING THE DRUM OPERATING SYSTEM FROM THE DRUM

The following procedure may be used to load the Operating System from the drum:

1. If the Emergency Dump is to be called before loading the system, set breakpoint one (BP1).
2. Depress GEN RES, then depress LOAD CONSOLE, and type in the following:

```
[0000000000
E[0000000000
4[000000249
```



Depress RELEASE and then START.

3. If BP1 has been set, a timeout will occur requesting "LIMITS." Type in the limits of memory to be printed.
4. If BP1 has not been set, or after the HSM limits have been printed and START depressed, a timeout will occur requesting "DATE".
5. Type in "XXXXXX" where "XXXXXX" is the date.
6. Depress RELEASE.
7. Follow System Initiation procedures starting at A.4 above.

D. PROCESS EXECUTION

1. Issue the Initiate console routine (Ø1).

a. If there is a "D" in column 19 of the STARTP parameter card and drum parameters were not utilized at process generation time, the message "ENTER_DRUM_PARAMETERS" will be typed. If drum parameters were utilized at process generation time, the message "ENTER_DRUM_PARAMETERS" will be typed only if column 13 of the STARTP parameter card contains the letter H.

- 1) The message "ENTER_DRUM_PARAMETERS" will be typed informing the operator that object time DRMPAR parameters may be introduced.

- 2) The following replies may be introduced:

21_NNP = read object time DRMPAR's or corrected
DRMPAR's from device NN.

Ø2 = continue

Ø3 = terminate processing

Ø4_XXYY = delete DRMPAR entry for XX segment
YY sequence.

- 3) The following timeout will occur if a sequence cannot be assigned to the drum.

XXYY_L _ _ _ NONE _ _ _ DRUM

XX = segment number

YY = sequence number

D. PROCESS EXECUTION (Cont'd)

- 4) After all DRMPAR's have been entered, an Ø2 is typed.
- b. If the Initiate messages begin with 01S or 01P, the following will occur:
 - 1) A message "ENTER_PROCESS_PARAMETERS will be typed. This informs the operator that object time DEVPAR, LABPAR, and/or INFPAR parameters may be introduced.
 - 2) After these object time parameters (if any) have been entered, Ø2 is typed to cause device assignment typeouts to occur.
 - 3) After the operator has changed or accepted the device assignments, Ø2 is again typed to continue loading.
 - 4) The ENTER SEG Ø1 PATCHES message will be typed. After patches are applied, or other applicable console routines are executed, the Ø2 console routine is issued.
- c. If the Initiate console routine begins with Ø1_, the Device Assignments are typed out. After the operator has changed, or accepted device assignments, Ø2 is typed to continue.
- d. Processing will now continue under control of the Operating System.
- e. Following are the messages that are typed during process initiation:

4.	Message	Meaning	Action
	ENTER_PROCESS_ PARAMETERS	Halt after loading first segment of the process because the Stop option of the Initiate routine (01) was used, or because of an H in column 13 of the STARTUP parameter used at process generation time. At this halt, only object time DEVPAR, INEPPAR, and/or LABPAR parameters may be introduced.	If no parameters are to be entered, type 02_. If DEVPAR, INEPPAR, and/or LABPAR parameters are to be entered, respond with the following, as applicable:

4. Continued

Message

Meaning

Action

1. 21_XXP^R__NNN EF
ED

XX = device contain-
ing parameters
P = priming code
R = rewind the device
NNN = count to unwind:

-- = blocks

EF = EF's

ED = ED's

Type an 02, after the last
21 entry to begin pro-
cessing.

* NOTE: XXP must not con-
tain 760

- * 2. A read is staticized
initially to the type-
writer to accept
parameters. There-
fore, enter DEVPAR
INFPAR, and/or LABPAR
directly from the
console typewriter.
3. Type 02 to begin pro-
cessing.
4. Type 03 to "break"
device assignment
linkage. Request may
then be depressed and
the 03 console routine
may then be used to
terminate the process.

* Addition - February 19, 1968

4. Continued

Message

Meaning

Action

The following messages terminate parameter lists contained on cards or tapes.

ED - letters ED in columns or tape positions 1 and 2 followed by a space.

E/F = one character E/F on magnetic tape or card message (col. 1) remainder of card should be blank.

MESSAGE	MEANING	ACTION
SSCC_{LXX}_{AXX}-OPTL_ [F] [W] - [XXXXXXXX] SSCC_{LXX}_{AXX}-ADYY_TTTT_ PP_{F} [W] - [XXXXXXXX]	The file (XXXXXXXX) on logical (L) or actual (A) device no. XX is optional. Typed response for each device parameter; indicates the assignment of actual device YY on which a work tape or file is to be mounted. Meanings of mnemonics additional to those explained in the previous message: SS = Segment number CC = Sequence number ADYY = Actual Device YY #### = Device not available; couldn't be assigned. NONE = Minimum number of devices was specified as zero or no device was assigned by device assignment. TTTT = device type as follows: -581 Tape Station -582 Tape Station -681 Tape Station 3487 Tape Station 3485 Tape Station PRNT Printer CRDR Card Reader CRDP Card Punch PRDR Paper Tape Reader PPCH Paper Tape Punch MIX None CNSL Console Typewriter PP = Prime Code	Type Y if optional file is to be mounted; otherwise, type N for no. Informative typeout. For any changes to the list, reply to "TYPE_IN_CHANGES" message.

(Cont'd)

MESSAGE	MEANING	ACTION
TYPE IN CHANGES	Changes may now be entered to any of the assignments previously typed on the Console Typewriter except those pertinent to 3488 files.	Respond with one of the following: 1. SSCC_ADYYP [,YYP] [,] [,0] ADYYP = actual device YY, priming code P ,YYP = additional changes , = don't change this assignment ,0 = delete rest of assignment list 2. SSCCNN_ADYYP [,YYP] [,] [,0] Same as message 1 except NN = device change #; e.g., change the 3rd device assignment in the list. 3. SSCC_NONE = treat the file as optional not present. 4. 02 must be the last entry to terminate the list. 5. 03 breaks device assignment linkage allowing the 03 console routine to be executed.
ENTER SEG SS PATCHES	The load and stop option of console routine 01 has been used.	Patches or other applicable console routines may be used or applied to segment SS. Type 02_XXXXX where XXXXX is the process ID.

Processing begins; follow actions specified by typeouts.

E. EMERGENCY MEMORY PRINT

An emergency memory print is contained on the Operating System tape. This may be used for those situations where console routine 17 (Memory Print) can not be used. The memory print destroys locations 0000-0249, and the Operating System overlay area. The System Tape Generator may be used to float the memory print into an area immediately to the left of the Operating System rather than within the overlay area. All registers with the exception of the index and increment registers will be destroyed.

Operating Procedure

1. Rewind the Operating System tape, and place Breakpoint #1 on.
2. Depress LOAD TAPE and load the Operating System tape.
3. The message LIMITS will be typed. Respond with the following:
XXXXXX_YYYYYY
where XXXXXX = the actual lower limit address of the
area to be printed.
YYYYYY = the actual upper limit address of the
area to be printed.
4. At the end of the memory print, ZZZZ will be typed, and the
STOP light will be lit. To load the Operating System, depress
START twice.
5. The following halts may occur while using the Emergency Dump.

INSTRUCTION	MEANING	ACTION
..00010001	Printer is inoperable.	Depress START to continue when printer is operable.
..00020002	Low paper in printer.	Replace paper and depress START to continue.
..00030003	Printer parity error.	Depress START to continue.
..00040004	LIMITS message cannot be typed due to typewriter malfunction.	Depress START to print all memory.
..AAAA0104	ZZZZ message was typed.	Depress START to load Operating System tape.
..99999999	Abnormal termination while reading Operating System tape.	Retry loading the system tape.

F. 3301 STANDARD TYPEOUTS

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	019003	_YYY	Restart number (YYY) cannot be found.	Request and type valid 01 message.
XXXXX_	019004	_YYY_AA_BB	Invalid device reassign- ment requested during restart. YYY = restart number AA = old device number BB = new device number.	Type valid reassign- ment message.

B. Changed

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1. Prefix Code Meaning

XXXXX_ 111401 Same

Tape System - None. System tape
must be reloaded.
Tape/Drum System. Reinitiate
process.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXXX_	019008	_XXYY	Segment or sequence defined in one-file parameter or positioning parameter could not be found during restart.	Type correct parameter.
XXXXXX_	019201		Rerun dump not taken; diagnostic tape was not opened.	None
XXXXXX_	019212	_IIIIIIII_NN	Tape error encountered while positioning multi-file reel during restart. IIIIIIII = file ID NN = device #	(1) Mount correct tape and type 1 to position, or (2) Type 2 to bypass error and continue positioning.
XXXXXX_	019213	_IIIIIIII_NN	Incorrect label found when attempting to position tapes during restart. IIIIIIII = file ID NN = device #	(1) Mount correct tape and type 1 to position that file, (2) Type 2 to bypass label check and continue processing.
XXXXXX_	019216		Insufficient memory to initiate a restart, or a restart of a task was attempted with no task description on the restart tape.	None.
XXXXXX_	019217		*Device(s) required for restarting of task/process has already been assigned. (NN is FIRST ASSIGNED DEVICE ENCOUNTERED)	Restart should be initiated when required devices become available.
XXXXXX_	019409		Nonrecoverable tape error on restart tape.	Reinitiate restart.
XXXXXX_	019414		Nonrecoverable tape error has occurred while trying to take rerun dump.	Terminate process and restart.
XXXXXX_	019418	_NN	A nonrecoverable error occurred while positioning a data file on trunk NN.	Correct error condition and retry restart.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	019609		Limit of 30 device regions for rerun/restart has been exceeded. The balance of the regions will not be processed.	None.
XXXXX_	019610	_NN	Rerun dump is being taken. The indicated low-speed device (NN) must be marked.	Mark device and continue.
XXXXX_	019611	_NN	A nonpurgeable tape was found during positioning for restart.	(1) Type 1 to bypass error and continue processing, or (2) Mount correct tape and type 2 to indicate that another positioning parameter is to be accepted for this file.
XXXXX_	110001		4th position of Initiate (01) request is invalid.	Request and type valid 01 message.
XXXXX_	110006		Memory size indicated in 301 request is invalid.	Request and type valid 01 message.
XXXXX_	110009		MLT assignment differs from previous MLT assignment.	Request, and type valid 01 message.
XXXXX_	110010		MLT trunk requested has already been assigned to a previous process.	Request and type valid 01 message.
XXXXX_	110011		Initiate message contains zero's for the MLT.	Reinitiate the process.
XXXXX_	110012		Clock Inoperable at Process Initiation.	None.
XXXXX_	110202	<i>110013 INITIATE MSG. CONTAINS</i>	<i>ERRONEOUS MLT.</i> A task has been initiated while a task is already running.	<i>REINITIATE</i> None required. Invalid request.
XXXXX_	110204		301 program requested while 301 program was being executed.	None. Illegal request.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	110205		A 301 program cannot be initiated due to insufficient memory.	None. Request may be made when memory becomes available.
XXXXX_	110208		ID indicated in Terminate routine (03) could not be found.	Request and type valid 03 message.
XXXXX_	110407		A tape terminated abnormally during termination of a process (03 routine).	None. Process is terminated.
XXXXX_	111201	_XX	Invalid process ID, Task ID, or Seg.ID (XX). If XX is 00, process or task ID is not on tape. If XX is spaces, the process is not on the drum.	None if invalid process or task ID. If invalid segment ID, process must be terminated.
XXXXX_	111202		Segment description block was larger than user-defined area (STARTP parameter cols. 30-32).	None. Task is terminated.
XXXXX_	111401		Nonrecoverable tape error occurred while reading the Operating System tape or the MLT.	None. System Tape must be reloaded.
XXXXX_	111402		Nonrecoverable tape error occurred when reading task description block.	None. Task is terminated.
XXXXX_	115001		Start address (sequence number) could not be found within the segment description.	Terminate and correct process description parameters (STARTP cols. 20-21).
XXXXX_	115002		Sequence exceeds RHE of process area.	Terminate and correct process description parameters (STARTP cols. 43-48).
XXXXX_	115003		Insufficient memory for allocation of task description.	Retry task initiation after the process in execution has terminated.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	115601	_MRY_AAAAA_ BBBBBB	This message defines the limits of the memory area assigned to a given process. AAAAAA = LHE address BBBBBB = RHE address	
XXXXX_	115602		Insufficient memory to allocate a user's process.	Retry initiation when another process terminates.
XXXXX_	116201	_XXYYZZ	A relocatability control block contains an illegal float character. XXYY = segment # and sequence # within which the illegal block is contained. ZZ = illegal float character.	Terminate process and correct error. This is probably a tape error and requires process regeneration and/or re-assembly.
XXXXX_	116401		Nonrecoverable tape error while reading from MLT.	Terminate process. All other processes may continue.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXXX_	117001		The cause may be one of the following: 1. If normal sort, segment exit information was not defined for exit. 2. If sort is contained in COBOL generated object program, no input data was released to the sort.	1. If normal sort, terminate and correct process description parameters (SGEXIT). 2. If COBOL sort, terminate and correct program source to ensure input data is released to sort, then recompile.
XXXXXX_	117002		Start address (sequence and number) could not be found within the segment description. This is not the first segment of the process.	Terminate and correct process description parameters (SGEXIT) cols. 25-26).
XXXXXX_	117003		Load sequence could not be found.	} Terminate and correct process description parameters.
XXXXXX_	117004		Sequence defined in PASSEQ parameter could not be found in the segment description table.	
XXXXXX_	117005		Invalid exit load indicator. (Column 19 of SGEXIT parameter)	Terminate and correct process description parameter.
XXXXXX_	117006	_XX	Segment XX exceeds the RHE of the assigned process area.	Correct process description parameter (STARTP cols. 43-48).
XXXXXX_	117007		Process called at task exit is not defined in the task description.	Terminate task and correct task description parameters.
XXXXXX_	117008		A task exit has been reached that is not defined in the task description.	Terminate task and correct task description parameters.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATE		
BOOT_	11&001		Invalid message typed in response to DATE message during the loading of the Operating System tape.	Depress START to retry.
BOOT_	11&002		The drum Operating System is requested and it is not on the system tape.	Mount proper tape or request Tape Operating System. Restart.
BOOT_	11&201	_N	Attempt to load the Operating System tape from a tape station not specified in the APD table.	Reload systems tape from an acceptable device or create a new Systems Tape with the device included in the DEVICE parameter.
BOOT_	11&202		Systems error occurred while loading the Operating System.	Reload systems tape.
BOOT_	11&401	_XX	A nonrecoverable read error has occurred while loading the Operating System. XX is the ID of the last block successfully read.	Reload systems tape.
BOOT_	11&402		A nonrecoverable write error has occurred while writing the Operating System onto the drum or the drum is inoperable.	Reload the systems tape.
BOOT_	11&403		A nonrecoverable read error occurred while loading the Operating System from the drum.	Retry reloading the Operating System from the drum.
%%%%%%%%_	122001		Process/Segment ID specified in console routine could not be found.	Reissue console routine with correct ID.
%%%%%%%%_	122002		Sequence ID specified in console routine could not be found.	Reissue console routine with correct sequence number.
%%%%%%%%_	122003		The requested Process could not be found.	Reissue console routine with correct Process ID.
%%%%%%%%_	122004		Console routine 10 was used in attempt to set the P register.	Illegal request. Type correct register to be set.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
%%%%%	122006	_X.....X	Snapshot Print or Instruction Address Stop request contains an invalid ID. X....X is the first 19 characters of the request.	Reissue request with correct ID.
%%%%%	122019	_XXXXXYZZ	Snapshot Print sequence to be printed cannot be found. XXXXXYZZ is the Process, Segment, and Sequence ID contained within the console request.	Reissue request with correct ID.
%%%%%	122021		Invalid operator routine call number.	Type in valid call number.
%%%%%	122024		Console routine 05 issued with compatibility not in memory.	None. Request is rejected. Initiate Compatibility if desired.
%%%%%	122026		Third character of Write Sentinel request (20) is not D, F, or B.	None. Request is rejected.
%%%%%	122028		An 01 or 03 console routine was requested at a point where either the 01 or 03 was already activated. This may also occur during a rerun dump.	None. Request is rejected. Operator may attempt to issue the request at a later point.
%%%%%	122034		User attempted to open an invalid Diagnostic device. Console routine 13.	None. Request is rejected.
%%%%%	122036	_IMPROPER_PARAMETER	An error was detected in the input parameters of a console routine.	Reissue the console routine with the correct parameters.
%%%%%	122039		An improper entry exists in the input parameter of a console routine.	The console routine is terminated. Correct input parameter and retry.

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MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
%%%%%	122040	_NNP	A Write Tape Mark request has specified a prime Code other than 4 through 9. NNP is the device number and prime code in error. Tape marks have been written to all tapes with correct prime codes.	The request may be reissued for the tapes which have been rejected.
%%%%%_	122042		A file with the same identification already is stored on the index.	The console routine is terminated. Allocation cannot be accomplished. Allocation can be attempted by using a different file identification or by deallocating the existing file and then allocating it again.
%%%%%_	122044		A file to be deallocated or renamed is not on the drum.	The console routine is terminated. The file identification can be changed and the function attempted again.
%%%%%_	122408	_NNP_XXXXXX	A nonrecoverable error has been detected trying to open or close a diagnostic device. NN = actual device number. XXXXXX = ABCDED characters from region. Refer to File Sequence documentation.	Routine is terminated and may be reissued if desired. (A)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
%%%%%_	122409		Card read error has occurred during console routine execution.	To terminate routines type Z. To continue routine type C.
%%%%%_	122410		Printer parity error has occurred during console routine execution.	To terminate type Z. To continue type C.
%%%%%_	122411		A nonrecoverable error has occurred on output device of console routine.	None. Console routine has been terminated.
%%%%%_	122412		A nonrecoverable error has occurred on the input device of a console routine.	None. Console routine has been terminated.
%%%%%_	122415		Error was detected trying to rewind the input tape of a console routine. (The routine is terminated.)	None. The routine has been terminated.
%%%%%_	122420		A tape error has been detected while issuing a Snapshot Print.	To terminate type Z. To continue type C.
%%%%%_	122435		An error has occurred while trying to read an MLT patch block.	Process must be terminated. Systems tape should be checked.
%%%%%_	122437		Nonrecoverable drum error during a console routine execution.	The console routine is terminated. Drum is inoperable and must be restored to operability.
%%%%%_	122438	CMC_NOT_STARTED.	An attempt to turn on the CMC has failed.	Machine malfunction. Correct condition and retry.
%%%%%_	122440	X	A nonrecoverable error was detected on the output device. X is the symbolic device number of the output device.	None. The console routine is terminated. Output device must be restored to operability before retry.
%%%%%_	122613		Low paper has been detected on the printer during console routine.	Replenish paper and type C to continue.

MEANING			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
%%%%%%%%_	122618	X.....X	A Snapshot Print has been executed 100 times. X....X is the first 19 characters of the request.	To terminate snapshot type Z. To continue type C.
%%%%%%%%_	122621		Abnormal termination occurred (not EF/ED).	None. Routine has been terminated.
%%%%%%%%_	122627		User issued Close Diagnostic console routine (20) when no diagnostic was open.	None. Request is rejected.
%%%%%%%%_	122629		Console routine 13 (Open Diagnostic) issued to a device which was already assigned.	Type S to open device. Type NNP to open a different device. NN = octal device # P = prime code.
%%%%%%%%_	122630	_IS_XXXXYY_ ZZ_AAAAA	An Instruction Address Stop has occurred XXXXYY = Process/Seg. ID ZZ = Sequence ID AAAAA = Relative address.	Issue desired console routines.
%%%%%%%%_	122631		Open Diagnostic requested a device which is nonpurgeable.	Type 2 to open device. Type 1 to terminate console routine.
%%%%%%%%_	122632	_NN	Open Diagnostic issued to device NN which is not closed.	Type S to keep device opened. Type C to close device.
%%%%%%%%_	122633		Open Diagnostic was issued to a device which is inoperable.	None. Request is rejected.
%%%%%%%%_	122637	_CMC_ON	The CMC has been turned on.	Normal timeout.
%%%%%%%%_	122639	_CMC_OFF	The CMC has been turned off.	Normal timeout. Type 02 for user planned shutdown.

MEANING			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
%%%%%_	122641		The drum index is full, allocation is not possible because there is no room for the new entry.	The console routine is terminated. De-allocate an existing entry from the drum index, or expand the size of drum index by a new Systems Generation.
%%%%%_	122643		An indicated beginning sector is part of another file.	The console routine is terminated. Allocation cannot be accomplished. Allocation can be attempted by changing the beginning sector, requesting automatic allocation, or by deleting the file in conflict and then allocating the file.
%%%%%_	122645		An attempt has been made to deallocate the drum index (DRUMINDX) entry.	The console routine is terminated. The file identification can be changed and the function attempted again.
%%%%%_	122646		An attempt has been made to rename the drum index (DRUMINDX), operating system (OPERSYST) entry or a temporary file.	The console routine is terminated. The file identification can be changed and the function attempted again.
%%%%%_	122647	IIIIIIII_AAAA_ BBBB_C000	Successful allocation has occurred. The drum index entry is typed in the following format: IIIIIIII = File name AAAA = Beginning sector BBBB = Ending sector C000 = Control information C = 1-permanent file 0-temporary file 000-reserved	The console routine is terminated and processing can continue.

MEANING			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
%%%%	122938		The drum index was destroyed on the drum.	The process is terminated. Reinitialize the drum and restart.
%%%%	122948		The specified console routine can be used only when the Operating System is being executed from tape.	None
③ %%%%	12C636	_XXXXX_YYYYY_ AAAAAAAAAA	A system error has occurred within the indicated process. XXXXX=Process ID YYYYYY=Actual memory address AAAAAAAA=Actual instruction.	None. Issue desired console routines. If the Process ID is ECS_ _ and/or the address is in the Operating System, unpredictable results will occur if processing is continued.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
%%%%_	12D636	____XX____ AAAAAAAAAA	An overflow error has occurred within the indicated process. See 12C636 for a description of the appended data.	See 12C636.
%%%%_	12E636	____XX____ AAAAAAAAAA	An arithmetic error has occurred within the indicated process. See 12C636 for a description of the appended data.	See 12C636.
%%%%_	12P636	____XX____ AAAAAAAAAA	A PIN was issued within the indicated process. See 12C636 for a description of the appended data.	See 12C636.
COMPT	133019	X..X	Displayed parameter failed validation.	Correct and reapply.
COMPT	133021	X..X	Compatibility operator routine parameter failed validation.	Correct and reapply.
COMPT	133043	X..X	301 device code in parameter failed validation.	Correct and reapply.
COMPT	133047	X..X	301 device type code in parameter failed validation.	Correct and reapply.
COMPT	133051	X..X	3301 device code in parameter failed validation.	Correct and reapply.
COMPT	133055	X..X	Device substitution in displayed parameter failed validation.	Correct and reapply.
COMPT	133067	X..X	No match for change requested in parameter.	Correct and reapply or use ASSIGN parameter if 301 device code is correct.
COMPT	133071	X..X	Priming code in parameter failed validation.	Correct and reapply.

MEANING			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
COMPT	133259		301 device table exceeded.	Terminate compatibility and re-initiate.
COMPT	133403	ONAAAABBBB_CD	301 normal nonrecoverable I/O error. Where ONAAAABBBB is the instruction being executed when the error occurred. CD indicates the device termination conditions.	Error may be ignored by typing 02_COMPT if 3301 device is other than the MLT. If error is ignored, control is returned to the instruction following ONAAAABBBB.
COMPT	133407	ONAAAABBBB_CD	301 simo nonrecoverable I/O error. Where ONAAAABBBB is the next simo I/O instruction following the simo I/O instruction that caused the error. CD indicates the device termination conditions.	Error may be ignored by typing 02_COMPT if 3301 device is other than the MLT. If error is ignored, control is returned to ONAAAABBBB.
COMPT	133423		301 compatibility nonrecoverable I/O error.	Terminate.
.0	1D0101	00	a) Indicates that a device sequence was busy before an ISSUE was executed. (A FREEDV was not given after the last ISSUE.) b) An ISSUE was given to a file sequence that was described as optional and not present in answer to the 1D1603 message. c) Device not present.	Take necessary registers and memory dumps. Correct condition and restart process.
..	1D1401		Console Typewriter is inoperable.	Correct the condition causing the error; START to continue.
XXXXX_	1D1601	_NNP_YYYY	Erroneous device number (NNP) is assigned to file sequence (actual address YYYY).	Type the correct octal device number and prime code (NNP) to continue processing. DRUM = 520

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1D1603	_NN_IIIIIIII	The file indicated by IIIIIIII is an optional file, and is assigned to de- vice NN.	If the file is present type Y. If the file is not present type N.
XXXXX_	1D1604	_YY_ZZZ_*****	Card extract counter is equal to Zero. YY=race unit number Z/ZZ=magazine number/card number.	None. All Subsequent extractions of the same card will result in a bit being set in the device region (S 12-2 ²).
XXXXX_	1E0201	_NN	Parity error has been de- tected on the previous line printed (device NN).	Type a 1 to cause the following printout: "PREVIOUS PRINT LINE CON- TAINS PARITY ERROR." The "current" output line will then be printed and control returned to the process. Type a 2 to give an abnormal return to the user process with- out the special printout.
XXXXX_	1E0202	_NN	Low paper alarm on printer (device NN).	Replenish paper supply and depress RELEASE to continue.
XXXXX_	1E0210	_NN	DNF alarm has occurred on printer (device NN).	Type 1 to retry. Type 2 to give control to the user.
XXXXX_	1E0212	_NN	Printer is inoperable. (device NN).	Type 1 to retry. Type 2 to give control to the user.
XXXXX_	1E0301	_NN_AAAA	A multipunch error has oc- curred. The card contain- ing the error has been re- jected. The actual A address of the read-in area is AAAA. (Device NN)	To retry, correct and reload card and type a 1. Type 2 to give con- trol to the user.
XXXXX_	1E0302	_NN_AAAA	A photo-diode failure has occurred. The card con- taining the error has been rejected. The actual A address of the read-in area is AAAA. (Device is NN)	To retry, reload card, and type a 1. Type 2 to give control to the user.
XXXXX_	1E0310	_NN_AAAA	DNF alarm has occurred. The actual A address of the read-in area is AAAA. (De- vice is NN)	Type 1 to retry. Type 2 to give control to the user.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1E0312	_NN_AAAA	Card Reader is inoperable. The actual A address of the read-in area is AAAA. (Device is NN).	Type 1 to retry. Type 2 to give control to the user.
XXXXX_	1E0401	_NN	A write parity error has occurred. The RAW count is equal to 50.	None. Warning message that tape and/or tape station should be checked.
XXXXX_	1E0402	_NN	A write parity error has occurred while writing to tape station NN. Rollback counter is exhausted.	Type 1 to retry 20 additional times. Type 2 to give control to the user.
XXXXX_	1E0403	_NN	A magnetic tape alarm has occurred while writing to tape station NN.	None. Control is automatically returned to the user. Tape and/or tape station should be checked.
XXXXX_	1E0414	_NN	Tape station NN has gone inoperable upon initiation of a write instruction.	Type 1 to retry. Type 2 to give control to the user.
XXXXX_	1E0415	_NN	Tape station NN has gone inoperable during execution.	None. Control is automatically returned to the user. Tape and/or tape station should be checked.
© XXXXX_	1E0416	_NN	A DNF has occurred on tape station NN during execution of a write instruction.	Insert Write Enable ring if missing, and type 1 to retry. Type 2 to give control to the user.
XXXXX_	1E0417	_NN	A DNF has occurred on tape station NN at the initiation of a write instruction.	If tape is not positioned at its physical end, type 1 to retry the command. If the tape is positioned at its physical end, type a 2 to give control to the user.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXXX_	1E0501	_NN	Read parity error has occurred on tape station NN. Roll-back was unable to correct the error.	Type 1 to retry Roll-back. Type 2 to give control to the user.
XXXXXX_	1E0502	_NN_DDDD	Read parity error has occurred on tape station NN. Station was primed in the compatible mode. DDDD = number of characters read when parity error occurred.	Type 1 to reread the block. Type 2 to give control to the user. Type 3 to read the next block.
XXXXXX_	1E0503	_NN	Leading guard character was missing from tape record (582/681/3485 RCA mode). No information was transferred into memory.	Type 1 to reread the block. Type 2 to give control to the user. Type 3 to read the next block.
XXXXXX_	1E0504	_NN_DDDD	50 Noise-Block records have been encountered on device NN. DDDD=number of characters read when parity error occurred.	None. Message is for information only.
XXXXXX_	1E0510	_NN	A DNF occurred on tape station NN while a read instruction was being executed.	No halt will occur. Control is returned to the user.
XXXXXX_	1E0511	_NN	A DNF occurred on tape station NN at the initiation of a read instruction.	Type 1 to retry. Type 2 to give control to the user.
XXXXXX_	1E0512	_NN	Tape station NN has gone inoperable upon initiation of a read instruction.	Type 1 to retry. Type 2 to give control to the user.
XXXXXX_	1E0513	_NN	Tape station NN has gone inoperable during execution of a read instruction.	None. Control will be returned to the user process.
XXXXXX_	1E0514	_NN	An MTA error has occurred during execution of a read instruction on tape station NN.	None. Control will be returned to the user process.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1E0601	NN_ {READER PUNCH} _AAAA_FFFF	A parity error has been detected.	See Operator Action defined below.
XXXXX_	1E0610	NN_ {READER PUNCH} _AAAA_FFFF	A DNF has occurred at initiation.	
XXXXX_	1E0611	NN_ {READER PUNCH} _AAAA_FFFF	A DNF has occurred during execution.	
XXXXX_	1E0612	NN_ {READER PUNCH} _AAAA_FFFF	The device is inoperable at instruction initiation.	
XXXXX_	1E0613	NN_ {READER PUNCH} _AAAA_FFFF	The punch has gone inoperable during instruction execution.	
			AAAA = "A" address into which record was read, or from which record was punched.	
			FFFF = "A" address after error has occurred.	

OPERATOR ACTION

The paper-tape user has six options available at time of error recovery:

- Type a 1 and error recovery will retry the I/O with the original "A" address. This would be the option to select if the error occurred at time of initiation.
- Type a 2 and error recovery will return to the user at the "B" address of the FREEDV.
- Type a 3 and error recovery will retry the I/O using the Final "A" address (from the abnormally terminated I/O) as the new I/O "A" address. Use this option when, during reading or punching, equipment fails and retry from the point of failure is desired. Be sure that "A" final, as contained in the error recovery timeout message, agrees with the last character actually read or punched by reading HSM and/or examining the paper tape. "A" final should contain an address one character to the right (or to the left when reading reverse) of the last character actually read or punched.
- Type a 4 nnnnnn and error recovery will display 80 characters of HSM starting with the six-character address nnnnnn. This option (as well as option No. e below) may be useful if an attempt is being made to recover from an I/O which failed during execution (see option No. c above).
- Type a 5 nnnnnn aaaaaaaaaa and error recovery will transfer into the six-character HSM address nnnnnn, the 10 characters aaaaaaaaaa (must specify 10 characters).
- Type a 6 and error recovery will return to the user at the normal return address. This option may be used, for example, when bad parity has been corrected in HSM and it is desired to continue as though there was no error.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1E0701	_NN	Parity error (PE) detected during card punch execution. (One card is placed in the reject stacker.)	No action on these messages, they occur only if the user has not provided error recovery with a back-up area. Control will be returned to the user's abnormal return address.
XXXXX_	1E0702	_NN	Punch compare error (PCE) detected during card punch execution. (Two cards are placed in the reject stacker.)	
XXXXX_	1E0703	_NN	Twenty (20) PE's and/or PCE's have occurred on the card punch.	Type 1 to continue - no further typeouts will occur. Type 2 to return to the user abnormal return address. This is a warning message.
XXXXX_	1E0710	_NN	DNF error occurred on the card punch.	Type 1 to continue punching. Type 2 to return to the user abnormal return address.
XXXXX_	1E0711	_NN	Card punch is inoperable.	Correct the inoperable condition and type a 1 to continue punching. If inoperability is due to card jam or power failure, one of three options may be selected: (1) type 1 to continue punching from the last card, (2) type 2 to return control to the user abnormal return address, or (3) type 3 to repunch the cards in the BACKUP area.
XXXXX_	1E0712	_NN	Card Punch is inoperable, and a parity error has occurred.	Correct the inoperable condition; type a 1 to continue punching, or a 2 to return control to the user's abnormal return address.
XXXXX_	1E0713	_NN	Card punch is inoperable, and a punch compare error has occurred.	

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1E0801	_NN_IIIIIIII_ EFFGG	A flaw character was present in the magazine, card, and block specified, but a search of the magazine control card index failed to find a reference to the card and block numbers. This probably indicates a logic error. NN=device number IIIIIIII=file ID E=binary magazine # FF=binary card# GG=binary block#	None. Control is returned directly to the user's abnormal return address.
XXXXX_	1E0802	_NN_IIIIIIII_ EFFGG	A nonrecoverable parity error has occurred while reading a bucket from the home card or the magazine control card. NN=device number IIIIIIII=file ID E=binary magazine# FF=binary card# GG=binary block#	Type 1 to retry; type 2 to return control to the user's abnormal return address.
XXXXX_	1E0803	_NN_IIIIIIII_ EFFGG	A nonrecoverable parity error has occurred while reading an index block from the magazine control card.	Type 1 to retry; type 2 to return control to the user's abnormal return address. Type 3 to read next index block.
XXXXX_	1E0901	_NN_IIIIIIII_ EFFGG	Write error recovery has been entered 50 times for the magazine, card, and block number specified. NN=device number IIIIIIII=file ID E=binary magazine# FF=binary card# GG=binary block#	None. Processing will continue, but the card should be replaced as soon as possible.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1E0902	_NN_IIIIIIII_ EFFGG	Error recovery was unable to write a bucket to the home card. A flaw character was written, but could not be verified. See 1E0901 for a description of the appended message characters.	None, Control is returned to the users abnormal return address.
XXXXX_	1E0903	_NN_IIIIIIII_ EFFGG	Error recovery is unable to read the index block from the magazine control card. It is therefore unable to search for an available area in which to rewrite the bucket. See 1E0901 for a description of the appended message characters.	Type 1 to retry, Type 2 to return to the users abnormal return address. Type 3 to read the next index block. ©
XXXXX_	1E0904	_NN_IIIIIIII_ EFFGG	Error recovery is unable to find sufficient contiguous area on the magazine control card in which to rewrite the bucket. See 1E0901 for a description of the appended message characters.	None. Control is returned to the user's abnormal return address.
XXXXX_	1E0905	_NN_IIIIIIII_ EFFGG	A nonrecoverable parity error occurred while error recovery was attempting to write an updated index block to the magazine control card. See 1E0901 for a description of the appended message characters.	
XXXXX	1E0906	NN-IIIIIIII-EFFGG	Error recovery is unable to purge an Index entry from a magazine control card due to an uncoverable read error on the index block. See 1E0901 for a description of the "Variable Data".	None. Control is returned to the users normal return address.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1E1010	_NN_IIIIIIII_ EFFGG	A magazine is not present on the designated 3488 unit, or a software error has occurred. See 1E0901 for a description of the appended message characters.	Replace magazine and type 1 to retry the instruction. Type 2 to return control to the user's abnormal return address.
XXXXX_	1E1011	_NN_IIIIIIII_ EFFGG	The error may be caused by: 1. Inoperability on attempt to address device. 2. Address verification failed on Select or Pre-Select. 3. Machine malfunction 4. Power failure during reading, writing and selecting. 5. Card is absent. See 1E0901 for a description of the appended message characters.	If any of the conditions 1 thru 4 have occurred, manually GENERAL RESet the unit and type a 1. If card absent is indicated, mount the indicated card, manually GENERAL RESet the 3488 unit, and type 1 to retry. Type 2 to return control to the user's abnormal return address.
XXXXX_	1E1101	_NN	A read sector parity error has occurred on drum NN.	Type 1 to retry. Type 2 to return to the user's abnormal return address.
XXXXX_	1E1102	_NN	A write error has occurred while writing to drum NN.	
XXXXX_	1E1110	_NN	Drum NN is inoperable.	
XXXXX_	1E1111	_NN	Drum NN has a DNF condition. (Device not Following)	
XXXXX_	1E1201	_NN	Parity error occurred while receiving thru DXC NN.	Type 1 to retry.
XXXXX_	1E1202	_NN	Parity error occurred while transmitting thru DXC NN.	Type 2 to return to the user process.
XXXXX_	1E1210	_NN	Other DXC is inoperable	
XXXXX_	1E1211	_NN	A DNF occurred on the other DXC.	

XXXXXX_	1E1301	_NN_AAAA	Multi-Punch Error (MPE) or Read-Input Parity Error (RIPE)	Run out the remaining cards in the transport. Reinsert these same cards at the beginning of the input hopper, re-prime the unit and type a 1 to continue.
XXXXXX_	1E1302	_NN_AAAA	Read Check Error (RCE) or Read Memory Compare Error (RMCE)	
XXXXXX_	1E1310	_NN_AAAA	D.N.F.	If the error is <u>hopper empty</u>
XXXXXX_	1E1312	_NN_AAAA	Device Inoperable	replenish the cards in the input hopper, reprime the unit, and type a 1 to continue. If the error is <u>stacker full</u> , remove the cards from the output stacker turn the unit on, and type a 1 to continue. If the DNF or INOP is not caused by hopper empty or stacker full, then follow the procedure for error ID's 01 and 12.

XXXXXX_	1F0007	_IIIIIIII	CLOSEL macro was issued to file IIIIIIII, but was not preceded by an OPENL macro.	Type 01 to retry the label check (new reel is mounted); Type 02 to accept the reel (override label check). Type 03 to "break" FCP linkage and permit memory dumps etc. to be taken.
XXXXXX_	1F0008	_IIIIIIII	OPENL macro was issued to file IIIIIIII which is OPEN as a file.	
XXXXXX_	1F0009	_IIIIIIII_NN	Label on tape station NN, for file IIIIIIII, has failed purge date check. Next line typed will be the actual label on tape station NN.	
XXXXXX_	1F0010	_IIIIIIII_NNP	The BTL on tape station NN could not be read during label processing. P=the priming code for that tape station.	

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1F0011	_IIIIIIII_NN	Invalid BTL was found during input label processing. The next two lines typed are the existing and expected labels.	Type 01 to retry the label check (new reel is mounted); Type 02 to accept the reel (override label check). Type 03 to "break" FCP linkage and permit memory dumps etc. to be taken.
XXXXX_	1F0012	_IIIIIIII_NN	Invalid ETL was found during input reverse label processing on tape station NN. The next two lines typed are the existing and expected labels.	
XXXXX_	1F0013	_IIIIIIII_NN	The tape on tape station NN has been rejected by the USEBEG routine (user process).	
XXXXX_	1F0014	_IIIIIIII_NN	File IIIIIIII could not be found on the multifile reel mounted on tape station NN.	Type 01 to retry the label check (new reel is mounted); Type 02 to accept the reel (override label check-and assume reel is a single-file reel); Type 03 to "break" FCP linkage and permit memory dumps etc. to be taken.
XXXXX_	1F0015	_IIIIIIII_NN	End of reel has occurred on file IIIIIIII. Only one tape station (NN) is assigned to the file.	Depress RELEASE when next reel is mounted.
XXXXX_	1F0016	_IIIIIIII_NN	Tape error occurred in OPEN input positioning, or label processing, on tape station NN.	Type 01 to retry; type 03 to "break" FCP linkage and permit memory dumps etc. to be taken.
XXXXX_	1F0017	_IIIIIIII_NN	Tape error occurred in OPEN output processing on tape station NN.	

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1F0018	_IIIIIIII_NN	Tape error occurred while writing the BTL on tape station NN.	Type 01 to retry the label check (new reel is mounted); Type 02 to accept the reel (override label check). Type 03 to "break" FCP linkage and permit memory dumps etc. to be taken.
XXXXX_	1F0019	_IIIIIIII_NN	Tape error occurred while writing the E/F, ETL, or E/D during ETL Logic on station NN.	Type 02 to ignore error and cause the ETL logic to continue. Type 03 to "break" FCP linkage and permit operator routines to be used. (C)
XXXXX_	1F0020	_IIIIIIII_NN	Tape error occurred while reading the ETL or E/D on tape station NN during end-of-reel input processing (while reading the BTL if reverse processing was specified).	(C)
XXXXX_	1F0021	_IIIIIIII_NN_ BBBB	ETL failed label check during end-of-reel, input processing on tape station NN. BBBB=block count calculated by the FCP. The next line typed will be the label which is on tape.	Type 02 to ignore error and continue EOR processing. Type 03 to "break" FCP linkage and permit operator routines to be used. (C)
XXXXX_	1F0022	_IIIIIIII_NN	No BTL was found on tape station NN.	Type 01 to retry the label check (new reel is mounted); Type 02 to accept the reel (override label check). Type 03 to "break" FCP linkage and permit memory dumps etc. to be taken.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1F0023	_IIIIIIII	No EI was found in the BLKAR/ALTAR after the return from the user USEBEG or USEEND routine.	Type 02 to ignore error; type 03 to "break" FCP linkage and permit operator routines to be used.
XXXXX_	1F0024	_IIIIIIII	C type record exceeds 4500 characters.	Take necessary registers and memory dumps. Correct condition and restart process.
XXXXX_	1F0025	_IIIIIIII_NN	Write error has occurred on tape station NN in close or end-of-reel output.	Type 02 to ignore error; type 03 to "break" FCP linkage and permit operator routines to be used.
XXXXX_	1F0026	_IIIIIIII	CLOSER macro was issued a file IIIIIIII which was not open.	Take necessary registers and memory dumps. Correct condition and restart process.
XXXXX_	1F0027	_IIIIIIII_NN	No BTL was found on a file IIIIIIII which was being processed in reverse.	Type 02 to ignore error; type 03 to "break" FCP linkage and permit operator routines to be used.
.0	1F0028	0X	Nonrecoverable error occurred. Operator or the error recovery routine caused control to be transferred to the abnormal return address of the FCP file-control macro. Bit 2 ² of \$78 was not set when control was returned to the FCP. X is the actual device number on which the error occurred.	Take necessary registers and memory dumps. Correct condition and restart process. (The IEXXXX message preceding this message will indicate the specific error which has occurred. If the device is tape and no IEXXXX message precedes this message, the error may be a record which exceeds the allocated read-in-area.)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1F0029	_IIIIIIII	No bucket "bustout" vector was present on INSERT or WRITE macro to file IIIIIIII.	Type 02 to ignore. Type 03 to "break" FCP linkage and permit memory dumps etc. to be taken.
XXXXX_	1F0030	_IIIIIIII	INSERT macro was issued to 3488 file IIIIIIII which was not opened for overlay processing.	
XXXXX_	1F0031	_IIIIIIII	No end-of-file vector was provided for 3488 file IIIIIIII.	
XXXXX_	1F0032	_IIIIIIII	Write parity error occurred during OPEN or CLOSE for 3488 file IIIIIIII.	
XXXXX_	1F0033	_IIIIIIII	One of three conditions may exist: 1. A READ parity error occurred during the OPEN or CLOSE for 3488 file IIIIIIII. 2. One or more magazines containing System Control Files are not on-line. 3. A file being OPENed has not been allocated. Failure to run the On Line Catalogue Update routine also results in this typeout.	
XXXXX_	1F0034	_IIIIIIII	Illegal 3488 allocation was performed. A "Superfile" was defined as the base file of another "Superfile."	Take necessary registers and memory dumps. Correct condition and restart process.
XXXXX_	1F0035	_IIIIIIII	A write or read parity error occurred at the File Control level. The operator or the user error recovery routine failed to cause the error to be corrected. Failure to run the On Line Catalogue Update routine also results in this typeout.	

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1F0036	IIIIIIII	A CLOSE was issued to an Output file in the end-of-file "bustout" path. The last bucket created is not written to the 3488.	This is a warning message The file is CLOSED normally and processing continues.
XXXXX_	1G0101	_SSCC	Attempt to pass or pre-assign a label or device to a sequence which is not present.	
XXXXX_	1G0102	_SSCC	Attempt to pass or pre-assign a device or label to other than a file sequence.	
XXXXX_	1G0103	_SSCC	Attempt to pass or pre-assign a label to other than a label or file region.	
XXXXX_	1G0104	_SSCC	The number of devices to be assigned to a file sequence exceeds the number of device assignment decades attached to the file sequence. Check to see if DEVPARS are present after the SGMT card of the Process Generation Parameters.	
XXXXX_	1G0401	_NN	A nonrecoverable error has occurred on device NN, while reading the parameters after the 'ENTER_PROCESS_PARAMETERS' message.	None; the process will be terminated. Console routines may be used to print tapes or to print memory. 03 may then be typed to terminate and deallocate devices and memory assigned to this process.
XXXXX_	1G0402		Invalid code in positions 7-12 of device assignment typein.	
XXXXX_	1G0403		DEVPAR parameter is invalid.	
XXXXX_	1G0404		The sequence specified in the object time INFPAR parameter is not in Process-Segment 01.	
XXXXX_	1G0405		The Preassignment Table is of insufficient length to contain all device assignment information. Recalculate positions 23-25 of the DEVTAB.	

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2. The typeout "110203", which was undocumented, is an invalid typeout. Instead will appear the typeout "110001" which is already documented.

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3. Prefix	Code	Meaning	Action
XXXXXX_	019414	Abnormal termination has occurred on the tape rerun dump tape.	1. If abnormal termination is due to nonrecoverable tape error, respond to typeout with a "1". Terminate process and restart. 2. If abnormal, termination is due to ETW, rewind the <i>ESISA</i>

ADDED/CHANGED DOCUMENTATION

A. Added

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1. Prefix	Code	Variable Data	Meaning	Action
XXXXXX_	1F0037	IIIIIIII	A read was issued to a file (IIIIIIII) that is not open.	Take necessary registers and memory dumps correct condition and restart process.
XXXXXX_	1F0038	IIIIIIII	A write was issued to a file (IIIIIIII) that is not open.	Take necessary registers and memory dumps correct condition and restart process.

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MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1G0411	_X...X	The file sequence contained in the appended DEVDIS parameter could not be found in the pre-assignment table for the "old" process.	} Terminate task and correct task description parameters.
XXXXX_	1G0412		Not enough area in the preassignment table of the "new" process to receive devices and/or labels that were passed by DEVDIS or LABDIS task description parameters.	
XXXXX_	1G0413	_XX	Erroneous process ID in PREXIT task description parameter. The relative process ID is appended - XX	
XXXXX_	1G0414	_XX	A LABDIS task description parameter designated a receiving sequence that is not a file sequence. XX is the ID.	
XXXXX_	1G0415	_XXXX	A DEVDIS task description parameter designated a file sequence that does not contain enough device assignment decodes to receive the devices. Check Process Generation parameters for DEVPAR's following the SGMT card.	

©

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1G0416		The "old" file sequence in the DEV-DIS parameter cannot be found.	Terminate task and correct task description parameters.
XXXXX_	1G0417		A label has been passed to a file sequence that does not exist.	
XXXXX_	1G0418	XX:XX:XX_YY:YY:YY_ZZ:ZZ:ZZ	Process has terminated. XX:XX:XX = Start Time YY:YY:YY = Stop Time ZZ:ZZ:ZZ = Elapsed Time	None.
XXXXX_	1G0419	XX:XX:XX	Clock has become inoperable between initiation and termination of a Process. XX:XX:XX = Start Time	None.
XXXXX_	1G0500		Device NN of 21_NNP is not on system.	Determine correct NN and re-enter upon request.
XXXXX_	1G0501		Invalid reply to "ENTER DRUM PARAMETERS".	Reply must be "21_NNP", "02", "03", "04". Determine correct response and re-enter upon request.
XXXXX_	1G0502		Two DRMPAR parameters for the same sequence have different file ID's.	Both DRMPAR parameters displayed are rejected. Correct and re-enter upon request.
XXXXX_	1G0503		Pass-preassignment table too small for object time DRMPAR parameters.	Terminate the process. Correct DEVTAB parameter and regenerate the process.
XXXXX_	1G0504	_X_YY	Nonrecoverable read/write error. X = device YY = C & D characters (See File Region documentation).	Terminate the process. Correct abnormal condition and restart process.
XXXXX_	1G0505		Invalid DRMPAR parameter. (Cols. 7-12)	Displayed DRMPAR parameter rejected. Correct and re-enter upon request.
XXXXX_	1G0506		Delete entry not found in drum index.	Entry ignored. Process continues.

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
XXXXX_	1G0507		Invalid DRMPAR parameter. (Cols. 14-17)	Displayed DRMPAR parameter rejected. Correct and re-enter.
XXXXX_	1G0510	_FFFFFFFF	Attempting to assign a permanent file on the drum that is already assigned to another process. FFFFFFFFFF = File ID.	Terminate the process. Assign another file or wait until FFFFFFFFFF is unassigned. Then restart process.
XXXXX_	1G0520		Sectors requested in displayed DRMPAR parameter are not available.	Terminate the process. Change DRMPAR parameter to request a device or wait until another process has terminated. Then restart process.
XXXXX_	1G0530		Drum index too small.	Terminate the process. Generate a new Op/System requesting a larger drum index or wait until another process has terminated. Then restart process.
XXXXX_	1G0540	_X_YY	Nonrecoverable read/write error. X = device # YY = C & D characters.	Terminate the process. Correct abnormal condition and restart process.
XXXXX_	1G0550	_FFFFFFFF	Attempting to assign a temporary file on the drum that is already assigned to another process. FFFFFFFFFF = file ID.	Terminate the process. Assign another file or wait until FFFFFFFFFF is deallocated. Then restart process.
XXXXX_	1G0560		Attempting to de-allocate a file that is not present in the drum index.	Condition ignored. Process continues.

G. NONSTANDARD OPERATING SYSTEM TYPEOUTS (Cont'd)

MESSAGE	MEANING	OPERATION ACTION
DXC_ _1E12XXXX_NN_ RESET	An abnormal termination occurred while sending or receiving the DXC acknowledgment characters. XXXX = the file sequence characters \$10-\$13, NN = the DXC involved.	Terminate the processes in both computers, correct the condition, and re-start.

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2. Non standard operating system typeouts

Message	Meaning	Action
XXXXX_I/O_MRPE_ODAAAABBBB	An I/O MRPE has occurred within the specified process. O--Command and Mode D--Device AAAA--A--adrs. of Command BBBB--B--addr. of Command	None. This is strictly an informative typeout. The error condition should be corrected.

(A)

MESSAGE	MEANING	ACTION
E9_(first 20 characters of patch)	A data patch has been entered with nothing in the data field.	Enter the correct patch. The invalid patch has been rejected, but a space has been stored in the address specified by the invalid patch.
E17	Not enough room to store patch parameters. The message typed out has been rejected. All other messages will be applied.	None. When existing messages have been applied, the READY light will come on and code 12 patches may then be applied.
E35	Invalid characters in 3488 table.	Reload System. If failure continues, create a new Systems Tape by way of SYSGN.
E36 - RPPCCC	Magazine not Initialized. <u>Where:</u> R - Read/Write Read # CCC - Card # PP - Magazine position MMMM - Magazine serial	Initialize magazine.
E37 - RPPCCC	Nonrecoverable not Initialized.	For user's information only.
E38 - RPPCCC	Nonrecoverable parity error has occurred.	Type 1_MMMMM to insert magazine serial # and continue. Type 2 - to try FCP error recovery.
E39	On-Line Catalogue control file not on-line.	Type 1_MMMMM to insert magazine serial # of the magazine containing the On-Line Catalogue control file. Type 2 - to terminate.
E40	Normal termination of console routine 22.	
CLOSE_FILE_XXXXXXX	Input file closed	} None, process continues
CLOSE_FILE_XXXXXXX, BLCT_XXXXXX, RAW_XX	Output file closed	
OPEN_FILE_XXXXXXX	OPEN macro	
OPEN_LABEL_XXXXXXX	OPENL macro	
IIIIIIII_EOR_NN,RL_#_YYY	Input reel closed on file IIIIIIII. NN is the device number. YYY is reel number.	

MESSAGE	MEANING	ACTION
IIIIIII_EOR_NN,RL_#_ YYY, BLCT_XXXXXX,RAW_ZZ	Output reel is closed on file IIIIIIII. NN is the device number. YYY is the reel number. ZZ is the read after write error count.	None, process continues
%%%%	The console routines will always type these five characters before issuing the read from the type-writer. This also signals termination of a console routine.	The operator may now request any console routine.

DO NOT USE

H. RERUN/RESTART OPERATING PROCEDURES

To restart:

1. Memory must be available to contain restarted process. The memory must be the actual locations used by the process when it was dumped.
2. For Operating Systems generated from MS series Master Tapes, type:

01 $\left\{ \begin{matrix} C \\ D \end{matrix} \right\} \left\{ \begin{matrix} R \\ T \end{matrix} \right\} \text{XXXXXMMQ} \left\{ \begin{matrix} - \\ 0 \\ 1 \\ 2 \\ 3 \end{matrix} \right\} \left\{ \begin{matrix} A \\ B \end{matrix} \right\} \text{YYYNNP}$

where: 01 = initiate operator routine.

C = restart is to be initiated.

D = restart is to be initiated with one-file option.

R = restart is to be initiated as a process.

T = restart is to be initiated as a task.

XXXXX = process ID of process to be restarted.

MM = device number of MLT.

Q = prime code of MLT.

space = restart tape is a diagnostic - do not reassign as diagnostic after restart.

0 = restart tape is a data file.

1 = assign restart tape as a diagnostic and position beyond all valid information.

2 = assign restart tape as a diagnostic and position beyond dump used for this restart.

3 = assign restart tape as a diagnostic and position behind BTL.

A = real-time process to be restarted.

B = general process to be restarted.

YYY = three-character restart number.

NN = device number of tape containing the process to be restarted.

P = prime code of restart tape.

3. For Operating Systems generated from ES series Master Tapes, type:

01 {C}{R} XXXXXMMQ $\begin{pmatrix} 0 \\ 1 \\ 2 \\ 3 \end{pmatrix}$ {A}{B} {D} YYYNP

where: 01 = call number

C = a restart is to be initiated

D = a restart with the one-file option is to be initiated.

R = a process is to be initiated.

T = a task is to be initiated.

XXXXX = five-character process/task ID

MMQ = octal MLT trunk number and priming code of the MLT when the complete process, or the first segment of the process, is on tape.

= zeros when the entire process is on the drum.

Space = restart tape is a diagnostic - do not assign as a diagnostic after restart.

0 = restart tape is a data file.

1 = assign restart tape as a diagnostic and position beyond all valid information.

2 = assign restart tape as a diagnostic and position beyond dump used for this restart.

3 = assign restart tape as diagnostic and position behind beginning tape label.

A = the process/task is a real-time process/task

B = the process/task is a general process/task

~~sp~~ = the process/task is completely on the MLT.

D = the process/task, or all segments but the first, is contained on the drum.

YYY = three-character rerun number.

NNP = octal device number and priming code of the restart tape.

3. After the selected dump is located, the device assignments are typed to the operator as follows:

DEVICE	FILE ID	BLK CNT	REEL CNT
NNP	XXXXXXXX	YYYYYY	ZZZZ

where: NN = two-character device number assigned.
Xp = one-character prime code.
XXXXXXXX = eight-character file ID (space if none present).
ZZZZ = four-character reel count, if applicable.

4. Any preassigned devices are then listed. This defines devices that are not currently in use, but which are present in the pre-assignment table.

PREASSIGNED DEVICES
NNP,NNP.....,NNP

5. After the device assignment messages have been typed, the READY light will be illuminated. The operator may then modify any device assignment using the following message:

NN,MM,NN,MM.....,NN,MM

where: NN = the current device number.

MM = the new device to be assigned.

Up to seven changes may be made on each typed line.

6. After device assignment changes have been made (if required), tapes mounted, and low speed devices positioned, a C should be typed to continue processing.
7. The following message will then be typed:

ENTER_POSITION_PARAM

The operator may position tape files based on other than the block count specified in the file sequence. The following message may be typed, if desired. If positioning by block count only is required, a C should be typed to continue.

XXYY- $\begin{Bmatrix} 0 \\ 1 \\ P \end{Bmatrix}$ -[AA]-[BBBBBB]

where: XXYY = segment and sequence number of the file sequence requiring special positioning.

P = purge date check.

0 = position before the required number of sentinels.

1 = position after the required number of sentinels.

AA = count of the number of tape sentinels.

BBBBBB = count of number of blocks tape is to be positioned.

As many parameters as are required may be used. A "C" should be typed when all positioning parameters have been entered.

8. The following message will be typed if the initiate message specified the one-file option:

ENTER_ONE_FILE_PARAM

The following message must be entered:

XXYY_ZZZZZZ

where: XX = segment number of the file sequence whose reel is to be re-created.

YY = sequence number of the file sequence whose reel is to be re-created.

ZZZZZZ = the six-character count indicating the number of blocks to be written.

9. The following message will be typed when the restart is complete:

XXXXXXYYY_RESTART_COMPLETE

where: XXXXX = five-character process ID.
YYY = three-character restart number.

10. Type C to continue normal processing.

Typeouts Rerun/Restart

MESSAGE	MEANING	ACTION
RERUN_DUMP XXXXXXXYYY_ COMPLETE_ON_TK_NN	A rerun dump has been completed. Process ID and dump number are typed.	None
XXXXX_END_OF_SPECIAL_ RERUN	A one-file option restart has been completed.	None
XXXXXXYYY_MARK_A	Rerun dump is being taken. The low-speed device must be marked: XXXXXX = process ID YYY = rerun dump number A = device number	Mark low-speed device and type Ø2.

A)

The following should be noted when restarting a task or process.

1. The MLT containing the process or task to be restarted cannot be mounted on a trunk assigned to the process at the time the rerun dump was taken.
2. If the rerun dump being used for restart was taken on a data tape, it must be mounted using one of the following two methods:
 - a. The restart tape can be mounted on the same trunk used by the original process. If this method is chosen, the assignment for that data tape can not be changed.
 - b. The restart tape can be mounted on a trunk other than one assigned to the process at the time the rerun dump was taken. If this method is chosen, 1) the assignment for the data tape can be changed to the same trunk as the restart tape, 2) the assignment for the data tape can be left unchanged, or 3) the assignment for the data tape can be changed to a trunk previously unassigned at the time the rerun dump was taken.
3. A process or task can be successfully restarted if the devices originally assigned to the process are not assigned to any other process at the time of restart.
4. Changes can be made to device assignment during restart if the device to which the assignment is being changed has not been assigned to any other process at the time of restart.

III. RCA 3301 CONSOLE ROUTINES

- A. All 3301 console routines are initiated by console requests. The console request requires the following procedure.
1. Depress the REQUEST button. The message %%%% is typed, a read is issued to the typewriter, and the READY light is illuminated.
 2. Type in request. If an error is made, depress the CANCEL button, and type in the request again.
 3. Depress the RELEASE button. The typeout %%%% occurs indicating that the request has been serviced. At this time, the operator may issue another read to the typewriter, except in the following three cases:
 - a. Initiate and Execute. If the request was for process initiation with continuous execution, control will be given to the Operating System.
 - b. Continue. If the request was for continuation of an initiated process, control will be given to the Operating System until the next requested interruption.
 - c. Execute 301 Instruction - The REQUEST button must be depressed each time it is desired to issue an 05 instruction.

Each request consists of a two-character code followed by the parameter information necessary to each routine. Since all processes are floatable, each request requires enough qualification to determine which process, segment, or sequence is being referenced.

Some console routines may require lengthy parameters to be typed. In order to save time and minimize errors, a provision has been made to accept calls for these routines from cards as well as the Console Typewriter. The user must specify which device he is using by an Accept Patches request on the typewriter.

- B. The following process ID's are restricted for use by the Operating System:

ECS_ _
COMPT
%%%%

The use of the above process ID's (with the exception of 02_COMPT) can result in errors that require reinitiation of the Operating System.

RCA 3301 CONSOLE ROUTINES

<u>Call Code</u>	<u>Title of Routine</u>	<u>Page No.</u>
01	Initiate	III-3
02	Continue	III-5
03	Terminate	III-6
04	Accept Patches/Traps	III-7
05	Execute 301 Function	III-8
06	Display Environment	III-9
07	Display Register	III-10
08	Display HSM	III-12
09	Display Sequence Table	III-13
10	Set Register	III-14
11	Process Memory Patch	III-15
12	Segment Memory Patch	III-16
13	Open Diagnostic Device	III-21
14	Tape Edit	III-22
15	Instruction Address Stop	III-23
16	Snapshot Print	III-25
17	Memory Dump	III-27
19	Device Status	III-28
20	Close Diagnostic/Write Sentinel	III-29
21	Display Assigned Memory	III-30
22	On-Line Catalogue Update	III-31
28	Write IBM Tape Mark	III-31B
29	Display Available Devices	III-31C
33	Start CMC	III-32
34	Stop CMC	III-33
35	Change Line Slot Status	III-34



RCA 3301 CONSOLE ROUTINES (Cont'd)

<u>Call Code</u>	<u>Title of Routine</u>	<u>Page No.</u>
40	Initiate Drum	III-35
41	Drum Index Edit	III-36
42	Drum Print	III-37
43	Allocate Drum File	III-38
44	Deallocate Drum File	III-39
45	Rename Drum File	III-40

01 - INITIATE

General Description

Initiate loads a new process or task into memory. Options permit the operator to obtain control after the first segment is loaded, or after each segment is loaded. The operator may indicate the relative location within the available memory into which the process is to be loaded. A code indicates whether this is a real-time or general process/task.

A process can be loaded completely from tape to drum, or the first segment of the process can be loaded from tape and the rest of the process from drum.

Format

01 $\left\{ \begin{array}{c} - \\ P \\ S \end{array} \right\} \left\{ \begin{array}{c} R \\ T \end{array} \right\} \text{XXXXXNNP} \left\{ \begin{array}{c} 7 \\ 8 \\ 9 \end{array} \right\} \left\{ \begin{array}{c} A \\ B \end{array} \right\} \left\{ \begin{array}{c} - \\ D \end{array} \right\}$

where: 01 = Initiate call number

Space $\underline{\quad}$ = load and execute

$\underline{P}$ = load process and return control to the operator after the first segment is loaded*

$\underline{S}$ = load process and return control to the operator after each segment is loaded*

* The P and S options will cause a message ENTER_PROCESS_PARAMETERS to be typed. DEVPAR, INFPAR, and/or LABPAR parameters may then be entered at object time.

NOTE: The message "ENTER_DRUM_PARAMETERS" may be typed preceding the "ENTER_PROCESS_PARAMETERS" message. DRMPAR parameters may then be entered at object time.

$\underline{R}$ = process to be initiated.

$\underline{T}$ = task is to be initiated. (See Appendix O.)

XXXXX = process/task to be initiated.

NNP = device number and priming code of MLT if complete process or first segment of process is on tape. Zeroes if complete process is on the drum.

$\underline{7}$ = allocate memory high-order to low-order leaving 6,200 characters to the left of the Operating System. ©

$\underline{8}$ = allocate memory to this process from high-order to low-order.

$\underline{9}$ = allocate memory to this process starting at the first available low-order location.

$\underline{A}$ = real-time process/task.

$\underline{B}$ = general process/task.

$\underline{\quad}$ = process is located on tape only.

$\underline{D}$ = process or all but the first segment of the process is located on the drum.

INITIATE 301 COMPATIBILITY

© The Initiate call will also load the 301 Compatibility routine into memory. Sixty two hundred characters of memory must be available immediately to the left of the Operating System.

Format

$$01_COMPT \left\{ \begin{matrix} 10 \\ 20 \\ 40 \end{matrix} \right\} \left[\begin{matrix} NNP \end{matrix} \right]$$

where COMPT = 301 compatibility ID

10 = reserve 10K of memory for the 301 programs.

20 = reserve 20K of memory for the 301 programs.

40 = reserve 40K of memory for the 301 programs.

NN = device number of MLT if 301 program is on 3301 MLT.

P = priming code of MLT.

02 - CONTINUE

General Description

The Continue function resumes execution of a LOCKED process at the interrupted point, or at a different point. An option permits the operator to transfer control to the Operating System leaving the process locked.

Format

02_ {SELECT
XXXXX_} [SQ_address]

where 02 = Continue call number.
SELECT = return to Operating System leaving any locked task-locked.
XXXXX = ID of process to which control is to be returned.
SQ = sequence ID of sequence from which to continue if process is to be continued at other than the point of interrupt.
Address = six-character, sequence-relative address to which control is to be transferred.

03 - TERMINATE

General Description

This routine permits the operator to terminate a process/task. All memory and devices assigned to that process or task are deallocated.

Format

03_XXXXX $\begin{Bmatrix} \overline{1} \\ 2 \end{Bmatrix}$ $\begin{Bmatrix} \overline{3} \\ 4 \end{Bmatrix}$

where

- 03 = Terminate call number
- XXXXX = ID of process/task to be terminated
- 1 = issue all I/O commands on the queue table for this process/task
- or 2 = terminate and ignore queue table
- 3 = terminate all output files with E/F, End Tape Label, E/F and E/D
- or 4 = terminate without writing sentinals and label to the output tape.

This routine precedes console routines 11, 12, 15 #6

04 - ACCEPT PATCHES/TRAPS

General Description

This routine informs the Operating System that patches and/or debugging traps are to be set, and specifies whether they are on cards, on magnetic tape in card format, on paper tape, or are to be typed in at the Console Typewriter. The patches and/or traps are read in and either applied, or stored until the appropriate segment is loaded. Every time the designated segment is loaded, the stored patches and/or traps are applied before control is transferred to the segment. The end of the patches and/or traps is signaled by a message containing ED characters in columns 1 and 2. If the Card Reader is used, a blank card must follow the ED card. Any time patches/traps are applied through the Console Typewriter using this routine, the letters ED must be typed in as the last message.

The debugging routines - Instruction Address Stop, Snapshot Print, and the Process Memory Patch - operate under control of the Accept Patches/Traps routine.

Format

$$04 \left\{ \begin{array}{c} C \\ P \\ M \\ T \end{array} \right\} - [NNP]$$

where 04 = Accept call number

C = patches/traps are on cards

P = patches/traps are on paper tape

M = patches/traps are on magnetic tape

T = patches/traps are to be typed in at the
Console Typewriter

NN = device number if magnetic tape is used

P = priming code

05 - EXECUTE 301 FUNCTION

General Description

This routine permits the user to perform 301 operator instructions only when Compatibility is in memory. If Compatibility is not present, the request will be rejected.

Execute 301 Instruction

Format

05_ONAAAABBBB

where 05 = call number

O = 301 Operation code

N = 301 "N" character

AAAA = "A" Address

BBBB = "B" Address

Note: This option does not save any previously existing 301 program conditions.

Set 301 Register

Format

05R_XXXX

where 05 = call number

R = P, A, or B register

XXXX = value to store in the register

This routine will only set the register. To continue, the 02 Continue routine must be issued.

Terminate 301

Format

05STOP

should be typed in at completion of 301 task only.

Initiate Loader

Format

05I

produced skeleton loader into 301 memory at 0260 and transfers control to 0260 to read 301 loader deck or execute cards.

Display 301 Registers

Format

05REGS

where 05 = call number

REGS causes compatibility to display the register settings of P, A, B, STA, and STP.

06 - DISPLAY ENVIRONMENT

General Description

This routine types the environment of the computer at the time of the request. The typeout indicates the active process, and the specific point at which all other processes were suspended.

Format

06

where 06 = Display Environment call number.

Typeout format

TTTTT (task in execution)

TTTTT_XXXXX_SG_AAAAAA_Y

where TTTTT = task ID
XXXXX = process ID
SG = segment ID at which the process was
suspended.
AAAAAA = actual address at which the process
was suspended.
Y = R if real-time task.
G if general task.

Note : if XXXXX = COMPT - the Compatibility routine
is in memory.
if XXXXX = %%% - Operator routine status
(always typed).

07 - DISPLAY REGISTER

General Description

This routine will display the contents of a specified micromagnetic memory register on the typewriter in both six-character and four-character format.

Format

07 { MM } Process ID

where 07 = Display Register call number
MM = register code (see table below)
----- = display all registers (R₀ through I₃)
Process ID = five-character process ID

REGISTER TYPE	CODE	REGISTER
STORED AT TIME OF OPERATOR REQUEST	R0 R1 R2 R3 R4 R5 R6	P A B STA STP CONTROL STPR
INDEX REGISTERS	M1 M2 M3	Index 1 Index 2 Index 3
INCREMENT REGISTERS	I1 I2 I3	Increment 1 Increment 2 Increment 3
ALL OTHER MMM REGISTERS	\$n	Where n is the machine address of the desired register. See Appendix B.

Type-Out Format

sixcharacters_fourcharacters

If the option to display all registers is used, the registers are displayed in the following order:

P
A
B
STA
STP
CONTROL
STPR
Index 1
Increment 1
Index 2
Increment 2
Index 3
Increment 3

08 - DISPLAY HSM

General Description

This routine will display on the Console Typewriter the contents of the memory area specified. The display may consist of any number of consecutive addresses, decades, or instructions within the same sequence, and may be in one of three formats:

- 1) Instruction. This format will be displayed as:

ON_a-address_b-address

The addresses will consist of a six-character, absolute-memory address, and a one-character address modifier, if applicable. If there is no address modification, a space will be typed.

- 2) Address. Each group of four consecutive characters will be displayed as a six-character, absolute memory address, and a one-character address modifier, if applicable.
- 3) Data. This format will type out the data as it appears in memory.

Format Option 1

$08 \begin{Bmatrix} D \\ I \\ A \end{Bmatrix} \text{procseg_sq_address1} \quad [\ominus \text{address2}]$

where 08 = Display HSM call number

D = display in data format

I = display in instruction format

A = display in address format

procseg = seven-character, process-segment ID

sq = two-character sequence ID

address1 = six-character relative address of first location of display

address2 = six-character relative address of last location of display

Format Option 2 - to display actual machine locations..

$08 \begin{Bmatrix} D \\ I \\ A \end{Bmatrix} \text{_address1} \quad [\ominus \text{address2}]$

09 - DISPLAY SEQUENCE TABLE

General Description

This routine will display on the Console Typewriter, the sequences contained in the current segment of the process specified. The display consists of the sequence identification, the LHE and the RHE assigned to the sequence.

Format

09_Process ID

where 09 = Display Sequence Table call number
Process ID = Five-character process ID

Type-Out Format

SEGMENT_NN
SE_lhe_rhe
etc.

10 - SET REGISTER

General Description

This routine sets the contents of the specified micro-magnetic-memory register to the sequence relative address specified. If the information to be typed in is not an address, the sequence number and the first two characters of the relative address may be zeros or spaces, but all the characters must be typed in.

Format

Process
10_MM_ ID _Sq_address

where 10 = Set Register call number
MM = register code (see table below)
ID = five-character process ID
Sq_address = sequence ID and relative location to be converted to an absolute memory address and inserted in specified register. These characters may be written as:
00_00NNNN or
-----NNNN

REGISTER TYPE	CODE	REGISTER
STORED AT TIME OF OPERATOR REQUEST	R0 R1 R2 R3 R4 R5 R6	P A B STA STP CONTROL STPR
INDEX REGISTERS	M1 M2 M3	
INCREMENT REGISTERS	I1 I2 I3	
ALL OTHER MMM REGISTERS	&n	Where n is the machine address of the desired register. See Appendix B.

11 - PROCESS MEMORY PATCH

General Description

This routine must be used with the Accept Patches/Traps routine (04). It allows patches to be retained in memory and applied at the appropriate time during execution of a process. Except for the two-character call number 11 (1 in columns 1 and 2), the formats are exactly the same as those for the Segment Memory Patch. (See detailed descriptions beginning on page III-16)

12 - SEGMENT MEMORY PATCH

The patch routines replace the contents of relative memory locations with the addresses, instructions, or characters specified by the user. This routine must be preceded by the 04 Accept Patches console routine when patches are entered from any device. ~~other than the console.~~ The end of patches is signaled by a message containing the characters ED in card column/tape positions 1 and 2 followed by 78 blank columns or positions.

Patches may be applied in either relative or absolute formats.

A. RELATIVE PATCHING

The patches must specify the format, process, segment, sequence, and relative location to be patched. The format may be one of three:

1. Data Patch

Memory will be replaced with the exact characters specified, with a maximum of 50 characters per message. Normally, the end of the patch will be signaled by the last nonspace character. If, therefore, the last character of the message is a space, it must be followed by a colon to signal the end of the message. If the last character of a patch is a colon, it must be followed by another colon. If the patch consists of more than 50 consecutive characters, it may be continued by placing a comma in the 51st data position of the message. (The 51st position may be used only for a comma or a colon.) Following is the format, including the card columns:

Columns

1-2	call number (12)
3	format (D)
4-10	seven-character, process-segment ID
11	space
12-13	sequence ID of patch
14	space
15-20	six-character relative address of patch
21	space
*22-71	any 3301 characters
*72	space, comma, or colon
73-80	any identification

* cols. 22-72 are used for continuation cards where more than one card is required for a patch. See NOTES, page III-20.

2. Instruction Patch

This format will cause the contents of sequence-relative addresses to be replaced in memory. A message may contain a maximum of two consecutive instructions, separated by a comma. Any number of consecutive instructions may be patched, as long as a comma follows each instruction, and only two are issued per message. The last consecutive instruction should not be followed by a comma. The format, including card columns, is:

Columns

1-2	call number (12)
3	format (I)
4-10	seven-character process-segment ID
11	space
12-13	sequence ID of patch
14	space
15-20	six-character relative address of patch
21	space
*22-23	ON operation code and N-character
24	space
25-26	sequence ID of A-address
27	space
28-33	six-character relative A-address
34	address modifier 1,2,3, or space
35	space
36-37	sequence ID of a B-address
38	space
39-44	six-character relative B-address
45	address modifier 1,2,3, or space
46	space, or comma if more <u>consecutive</u> instructions follow
47-48	ON operation code and N-character of second consecutive instruction
49	space
50-51	sequence ID of A-address
52	space
53-58	six-character relative A-address
59	address modifier 1,2,3 or space
60	space
61-62	sequence ID of a B-address
63	space
64-69	six-character relative B-address
70	address modifier 1,2,3, or space
71	space, or comma if more <u>consecutive</u> instructions follow
72	space
73-80	any identification

* cols. 22-71 are used for continuation cards where desired. See NOTES, page III-20.

3. Address Patch

This format will cause the contents of sequence-relative addresses to be replaced by one or more four-character addresses. A message may contain from one to four consecutive addresses, separated by commas. Any number of consecutive addresses may be patched, as long as a comma follows each address, and only four are issued per message. The last consecutive address should not be followed by a comma. The format, including card columns, is:

Columns

1-2	call number (12)
3	format (A)
4-10	seven-character process-segment ID
11	space
12-13	sequence ID of patch
14	space
15-20	six-character relative address of patch
21	space

(Continued)

Columns (Cont'd)

*22-23	sequence ID of first address
24	space
25-30	six-character relative address
31	address modifier 1,2,3, or space
32	space, or comma if more <u>consecutive</u> addresses follow
33-34	sequence ID of a second address
35	space
36-41	six-character relative address
42	address modifier 1,2,3, or space
43	space, or comma if more <u>consecutive</u> addresses follow
44-45	sequence ID of third address
46	space
47-52	six-character relative address
53	address modifier 1,2,3, or space
54	space, or comma if more <u>consecutive</u> addresses follow
55-56	sequence ID of fourth address
57	space
58-63	six-character relative address
64	address modifier 1,2,3, or space
65	space, or comma if more <u>consecutive</u> addresses follow in next message
66-72	spaces
73-80	any identification

* cols. 22-65 are used for continuation cards where desired. See NOTES, page III-20.

B. ABSOLUTE MEMORY PATCH

The patch routine will alter absolute memory locations in date, instruction, or address formats. These formats are available through the Console Typewriter or the card reader. This patch routine must be preceded by the 04 Accept Patches console routine and terminated by an E/D card, when patches are to be applied from cards.

1. Data Patch

Memory will be replaced with the exact characters specified, with a maximum of 50-characters per message. Normally the end of the patch will be signaled by the last nonspace character. Therefore, if the last character of the message is a space, it must be followed by a colon to signal the end of the message. If the last character of a patch is a colon, it must be followed by another colon. If the patch consists of more than 50 consecutive characters, it may be continued by placing a comma in the 51st data position of the message. (The 51st position may be used only for a comma or a colon.) Following is the format including the card columns:

Columns

1-2	call number (12)
3	format (D)
4	space
5-10	six-character address to be patched
11	space
*12-71	any 3301 characters
72	space, comma or colon
73-80	any identification

* cols. 12-72 are used for continuation cards where more than one card is required for a patch. See NOTES, page III-20.

2. Instruction Patch

Any number of consecutive instructions may be patched as long as a comma follows each instruction, and only 3 are issued per message. The last consecutive instruction should not be followed by a comma. The format including the card columns follows:

Columns

1-2	call number (12)
3	format (I)
4	space
5-10	six-character address to be patched
11	space
*12-13	ON operation code and N character
14	space
15-20	A-address
21	address modifier, 1,2,3, or space
22	space
23-28	B-address
29	address modifier 1,2,3, or space
30	space, or comma if more consecutive addresses follow
31-32	ON operation code and N character
33	space
34-39	A-address
40	address modifier 1,2,3, or space
41	space
42-47	B-address
48	address modifier 1,2,3, or space
49	space, or comma if more consecutive addresses follow
50-51	ON operation code and N character
52	space
53-58	A-address
59	address modifier 1,2,3, or space
60	space
61-66	B-address
67	address modifier 1,2,3, or space
68	space, or comma if more consecutive addresses follow
69-72	spaces
73-80	any identification

* Columns 12-68 are used for continuation cards where necessary.

See NOTES, page III-20.

3. Address Patch

A message may contain a maximum of seven consecutive addresses separated by commas. Any number of consecutive addresses may be patched as long as a comma follows each address and only seven are issued per message. The last consecutive address should not be followed by a comma. The format including the card columns follows:

Columns

1-2	call number (12)
3	format (A)
4	space
5-10	six-character address to be patched
11	space
*12-17	address 1
18	address modifier 1,2,3, or space
19	space, or comma if more consecutive addresses follow
20-25	address 2
26	address modifier 1,2,3, or space
27	space, or comma if more consecutive addresses follow
28-33	address 3
34	address modifier 1,2,3, or space
35	space, or comma if more consecutive addresses follow
36-41	address 4
42	address modifier 1,2,3, or space
43	space, or comma if more consecutive addresses follow
44-49	address 5
50	address modifier 1,2,3, or space
51	space, or comma if more consecutive addresses follow
52-57	address 6
58	address modifier 1,2,3, or space
59	space, or comma if more consecutive addresses follow
60-65	address 7
66	address modifier 1,2,3, or space
67	space, or comma if more consecutive addresses follow in the next message
68-72	spaces
73-80	any identification

* Columns 12-72 are used for continuation cards where more than one card is required for a patch.

- NOTES:
1. When continuation patches are entered from cards or magnetic tape, the continuation entries must start in position 22.
 2. When continuation patches are entered from the typewriter or paper tape, the continuation entries must start in position 1. In effect these messages are read into card or magnetic tape position 22.
 3. When using the continuation option for data patches (11D or 12D), the use of a colon to signify a space as the last character is not permitted. All characters included in the data field of all continuation cards will be stored, up to and including the last nonspace character.

13 - OPEN DIAGNOSTIC DEVICE

General Description

This routine specifies the device that is to receive the output of debugging routines, such as memory dumps and tape edits. All debugging routines requested will use this output device.

Format

13_NNP

where 13 = Open Diagnostic call number

NN = actual device number

P = prime character, or zero if prime character not required. See Appendix C for device priming details.

14 - TAPE EDIT

General Description

This routine edits the contents of an entire tape or selected file to the printer or to a diagnostic tape (for off-line printing). The input medium may be magnetic tape, paper tape, or cards.

Format

$$14 \left\{ \begin{array}{c} R \\ - \end{array} \right\} NNP_ [FF]$$

where 14 = Tape Edit call number
R = rewind input tape
- = do not rewind input tape
NN = octal device number of input device
P = priming code of input device
FF = Nth file of the tape. Multifile reels must adhere to 3301 multifile-reel conventions.

Note 1 : The maximum block size is 20,000 characters. Tape Edit will destroy memory locations 10,000 thru the length of the maximum message.

Note 2 : Tape Edit may be terminated by placing BKPT#1 on. The last block will be edited, and the tape will be rewound. If BKPT#1 is on when the Tape Edit is requested, it will not terminate the edit.

15 - INSTRUCTION ADDRESS STOP

General Description

This routine interrupts a process to allow the execution of additional operator and debugging routines. After execution of these routines, the interrupted process continues. The user may specify an instruction in his process which will be used to trigger the halt. One of two types of stops may be requested:

Option 1:

The user may specify how many times the instruction is to be executed before the halt occurs.

Option 2:

The user may specify that before execution of the specified instruction a data field is to be checked against a given key, and, on finding equality, the halt is to occur.

The Instruction Address Stop routine will locate the instruction, replace it with a program interrupt halt (PIN), and execute it out of line. Before the halt occurs, the instruction will be replaced in its original sequence.

When the halt occurs, the debugging system types out a message and issues a read to the typewriter. The user may then type in console routines. Operation of the user's process may be resumed by typing in the Continue routine (02).

The instruction specified for the stop must not be a Store instruction that stores the P, A, or B registers. Moreover, it cannot be an instruction that sets or senses the PRI settings. (A)

This routine must be used with the Accept Patches/Traps (04) routine to inform the debugging system the device from which the request will be issued. The request may be issued at one of two points:

(1) Process start time

Requests issued at this time are retained in memory until the applicable segment is loaded, at which time they will be executed.

(2) After execution of an Instruction Address Stop

When a typeout indicates that a stop has occurred, the user may type in another Accept Patches/Traps and issue more Instruction Address Stop requests.

Formats

Option 1:

Card Columns

1-2	call number 15
3	space
4-10	seven-character, process-segment ID
11	space
12-13	sequence ID of instruction upon which to stop
14	space
15-20	six-character relative address of instruction
21	space
22-23	number of times to execute the instruction before halting

Option 2

Card Columns

1-2	call number 15
3	space
4-10	seven-character, process-segment ID
11	space
12-13	sequence ID of instruction upon which to halt
14	space
15-20	six-character relative address of instruction
21	space
22-23	no. of characters in key
24	space
25-26	sequence ID of key
27	space
28-33	six-character relative location of key
34	space
35-54	key may be from one to twenty characters
55-72	spaces
73-80	any identification

16 - SNAPSHOT PRINT

General Description

This routine will edit the contents of selected sequences in memory at the interval specified by the user. These intervals are triggered by an instruction in the user's process.

The user may specify that a snapshot is to occur on every nth execution of the specified instruction. A snapshot will occur before every execution of the instruction if an nth execution is not specified. The Snapshot Print routine will locate the instruction, replace it with a PIN instruction, and execute it out of line. If the Snapshot Print is executed 100 times, a timeout will occur indicating this condition and the user has the option to continue executing snapshots or terminate this request. Termination will replace the user's instruction in line.

This routine must be used with the Accept Patches/Traps routine to inform the debugging system the device from which the request will be issued. The request may be issued at one of two points:

(1) Process start time

Requests issued at this time will be retained in memory until the applicable segment is loaded, at which time they will be executed.

(2) After execution of an Instruction Address Stop (15)

When a timeout indicates that a stop has occurred, the user may type in another Accept Patches/Trap and issue more debugging requests.

The instruction specified for a snapshot must not be a Store instruction that stores the P, A, or B Registers. Moreover, it cannot be an instruction that sets or senses the PRI settings.

Ⓐ

Format

Card Column

1-2	call number 16
3	space
4-10	seven-character process-segment ID
11	space
12-13	sequence ID of instruction specified for the snapshot
14	space
15-20	six-character relative address of instruction
21	space
22-23	number of times to execute the instruction between snapshots
24	space
25-26	sequence ID of first sequence to be snapped
27	space, or comma, if another sequence is to be snapped
28-29	sequence ID of second sequence to be snapped, or spaces, if no more sequences are to be snapped
30	space, or comma, if another sequence is to be snapped
31-32	third sequence ID, or spaces
33	space, or comma
34-35	fourth sequence ID, or spaces
36-72	spaces
72-80	any identification

17 - MEMORY DUMP

General Description

This routine will edit an entire application to the printer. The edit will contain the stored interrupt registers, including the three Index registers and increments. The edit may be in data and/or instruction format. The user must give the process ID of the process to be dumped. The user may get a dump of the entire memory by omitting the process ID. In this case, the actual micromagnetic memory registers will be printed. For examples see Appendix I.

Format

Option 1:

$$17 \left\{ \begin{array}{c} D \\ I \\ B \end{array} \right\} \text{ Process ID}$$

where 17=Memory Dump call number

D =data format

I =instruction format

B =instruction and data format

Process ID =five-character process ID

Format

Option 2: (to dump actual machine locations)

$$17 \left\{ \begin{array}{c} D \\ I \\ B \end{array} \right\} \begin{array}{cc} \text{address 1} & \text{address 2} \\ \uparrow & \uparrow \end{array}$$

where address 1 = six-character address of lower limit

address 2 = six-character address of upper limit

19 - DEVICE STATUS

General Description

This routine informs the Operating System that a specified device is inoperable, and therefore should not be assigned. It also informs the Operating System when the device again becomes operable, and is available for assignment.

Format

$$19 \left\{ \begin{array}{c} I \\ O \end{array} \right\} NN$$

where 19 = Device Status call number
I = device is inoperable
O = device is operable
NN = actual device number

20 - CLOSE DIAGNOSTIC/WRITE SENTINEL

General Description

This routine will close the diagnostic device and rewind it to BTL, or it will enable the operator to write sentinels to tape (EF, ED, or EF/ED).

Close Diagnostic

Format

20
where 20 = Close Diagnostic call number

Write Sentinel

Format

20 $\left\{ \begin{array}{c} F \\ D \\ R \end{array} \right\}$ NNP, NNP, NNP

where 20 = Write Sentinel call number

F = write EF } No Rewind

D = write ED }

B = write EF/ED and rewind tapes

NN = actual device number

P = priming code or zero (Appendix C)

If more than one tape unit is requested, each must be followed by a comma except the last, which must not be followed by a comma. A maximum of 10 devices are acceptable.

21 - DISPLAY ASSIGNED MEMORY

General Description

This routine will display on the Console Typewriter the areas of memory that are assigned either to the Operating System or to user tasks.

Format

21

where 21 = Display Assigned Memory call number

Typeout

LHE_OP_SYS_ _ _ LLLLLL*
XXXXX_ _MMMMM_NNNNNN

where LLLLLL = LHE of Operating System
MMMMM = LHE of task/process
NNNNN = RHE of task/process
XXXXX = process/task ID

* The leftmost limit of the Operating System will include the area used to store console routine
11 patches - if any are present.

22 - ON-LINE CATALOGUE UPDATE

General Description

This routine updates the On-Line Catalogue by posting the serial numbers of the magazines that are on-line. Posting is done by Read/Write head and magazine position to the On-Line Catalogue. This is accomplished by reading the Magazine Control Card from each magazine on-line, and extracting the serial number from the Magazine Control Card label. Whenever magazines are inserted into or removed from the 3488 unit, the On-Line Catalogue must be updated by this routine.

Format

22 {NP}

where 22 = On-Line Catalogue Update call number
 NP = optional entry to indicate that printing of
 the On-Line Catalogue is not required (No
 Printing).

(This page deleted, April 1966)

28 - WRITE IBM TAPE MARK

General Description

This routine will write an IBM Tape Mark to the magnetic tape or tapes specified in the request. A maximum of ten tapes may be specified.

Format

28 $\left\{ \begin{matrix} S \\ R \end{matrix} \right\}$ NNP, NNP,...NNP

28 = Write IBM Tape Mark call number

S = do not rewind tapes after writing TM

R = rewind tapes after writing TM

NN = octal device number of tapes to receive TM

P = prime code. This must be any number 4 through 9 (IBM compatible).

29 - DISPLAY AVAILABLE DEVICES

General Description

This routine displays on the Console Typewriter the octal device numbers of all devices on the system that are (1) operable and unassigned or (2) operable and capable of more than one device assignment.

Format

29

where: 29 = Display Available Devices call number

Typeout

The list of available devices will be displayed as follows:

xxx

NN

NN

.

.

.

NN

where: xxx = a constant

NN = octal device number of the available device

If the system contains a digital clock, the typeout is as follows:

DC_ [INOP]

where: DC = digital clock present

INOP = digital clock inoperable

© 33 - START CMC

General Description

This routine causes the hardware START CMC Instruction to be executed thereby permitting use of the Communications Mode Control.

Format

© 33_Process ID

© Where 33 = Start CMC call number
Process ID = five-character process ID

General Description

This routine initiates the CMC shutdown operation. Each Line Slot is placed in OFF Status (Input Prohibited) when all output data to be transmitted on that line are exhausted, and all inputs have been processed. Inputs in progress during execution of this routine are processed and permitted to terminate normally; i.e., the response will be transmitted prior to placing the line in OFF Status.

When all Line Slots are in OFF Status, the Stop CMC instruction is executed. Control is given to the user at the high-speed memory address specified by jump 6.

Format

34_Process ID

where:

34 = Stop CMC call number

Process ID = five-character Process ID

③ 35 - CHANGE LINE SLOT STATUS

General Description

This routine changes Line Slot status from ON to OFF or vice versa. If OFF, the Line Slot will not be serviced.

Format

35_Process ID_LLLS [,LLLS,LLLS...]

where:

35 = Change Line Slot Status call number

Process ID = five-character Process ID

LLL = line slot number

S = new status (2 = ON, 4 = OFF)

40 - INITIATE DRUM

General Description

The Initialize Drum routine creates a drum index on the drum so the tape system user can use the drum for data files. The drum index is placed on the drum, starting in sector 0001. The number of sectors which the drum index is to span was indicated at System Tape Generation time. The initialized index will be filled with spaces except for the first entry position which will contain the entry for drum index itself. This routine must not be executed when the Operating System is contained on the drum.

Format

40

(Rev. 12/65)

General Description

The Drum Index Edit function provides a typeout of the drum layout by way of the Console Typewriter or the On-Line Printer. All files and open areas that exist on the drum are reflected in the typeout. For each file stored on the drum its file identification, total number of sectors, beginning and ending sector, and control information are typed. For the entry of the drum index itself, the last sector number of the drum is printed in lieu of control information. For each open area between files stored on the drum or between the last file and the end of the drum, the total number of sectors, the beginning sector and the ending sector are typed. The drum index entry is identified by DRUMINDX and each open area is identified by OPEN AREA. When the operating system is stored on the drum, it is identified by OPERSYST.

Format

41 {P}

where P specifies the One-Line Printer as the output device.

Example

```

41
DRUM INDEX
FILE IDENT      TOTAL SECTORS  BEGIN SECTOR  END SECTOR  CONTROL INFO
  DRUMINDX      0010         0001         0010  (4095)
  OPERSYST      0573         0011         0583         0000
  OPEN AREA     3512         0584         4095
%%%%%%%%

```

42 - DRUM PRINT

General Description

The Drum Print function edits the contents of files stored on the drum and/or absolute areas of the drum to the on-line printer or to the diagnostic tape for printing at a later time. A maximum of seven absolute areas and/or files may be indicated with the input parameter.

When a nonrecoverable drum read error is detected for a sector, RE is printed next to the sector number. After each absolute area or file is processed, DRUM AREA PRINTED is printed following the last sector line. After the last absolute area of file in the input parameter is processed, DRUM PRINT IS COMPLETED is printed following the DRUM AREA PRINTED Message.

Format

42 {^B/_A} C XXXXXXXX [, {^C/_/} XXXXXXXX] [, {^C/_/} XXXXXXXX]

where: 42 = Drum Print call number.

B = space, the printer is to be used as the output device.

A = any character other than a space if a diagnostic tape is used.

C = space, if a file is to be printed.

/ = virgule, if an absolute area is to be printed.

XXXXXXXX = the file identification (eight characters) or the beginning and ending sector numbers of the absolute area (eight digits).

Up to six additional areas can be printed with a comma (,), as the first character and the C, /, and the XXXXXXXX characters as indicated above as the next nine characters.

43 - ALLOCATE DRUM FILE

General Description

The Allocate Drum File function allocates a data file on the drum by inserting an entry into the drum index for the file. The user may allocate the file or he may have the file allocated automatically.

Format

43_XXXXXXX_AAAA_BBBB_CCCC

43 = Allocate Drum File call number.

XXXXXXX = file identification (eight characters) of the file to be allocated.

AAAA = minimum number of sectors to be allocated (four digits).

BBBB = maximum number of sectors to be allocated (four digits).
If the minimum is also the maximum, this field will contain spaces. When the largest available area on the drum is desired, 9999 is placed in this field.

CCCC = absolute starting sector of the file (four digits) or if automatic allocation is desired, spaces will be indicated in this field.

Output

The drum index entry for the newly allocated file is typed out on the Console Typewriter. The index entry indicates the file identification, beginning sector, ending sector, and control information.

Example

```
43 AAAAAAAAA 1000 9000 3000
%%%%% 122647 AAAAAAAAA300040951000
%%%%%
```

44 - DEALLOCATE DRUM FILE

General Description

The Deallocate Drum File function frees an area of the drum which had been previously allocated. This is accomplished by deleting the file's entry in the drum index.

Format

44_XXXXXXXX

44 = Deallocate Drum File call number.

XXXXXXXX = file identification (eight characters) of the file to be deallocated.

45 - RENAME DRUM FILE

General Description

The Rename Drum File function changes the file identification of a file stored on the drum by changing the file identification in the drum index.

Format

45_XXXXXXXX_ZZZZZZZZ

45 = Rename Drum File call number.

XXXXXXXX = file identification (eight characters) of the file whose identification is to be changed.

ZZZZZZZZ = new file identification (eight characters).

IV. RCA 3301 SERVICE ROUTINES

INTRODUCTION

Process Execution:

All service routine processes are loaded and executed by console routines.

Parameters:

Some routines have input parameters. The parameter descriptions use the following symbols:

- a. [] indicates optional information.
- b. { } information within the braces indicates that a choice must be made.

File Name:

A file name preceded by a space is a required file; a file name preceded by the letter O is an optional file.

Device Assignment:

Device assignments given in device assignment statements may be changed through the FCP. For example, a magnetic tape unit may be substituted for the printer as the designated output device.

Typeouts:

All typeouts, error and normal, are preceded by the process ID.

RCA 3301 SERVICE ROUTINE INDEX

(A)

<u>Process ID</u>	<u>Title of Routine</u>	<u>Page No.</u>
1401S	3301/1401 Simulator	L-1
38CPY	3488 Data Copy	IV-82
38DMP	3488 DUMP	IV-85
38REP	3488 Card Replacement	IV-86A
ABMLT	MLT Abstract Listing	IV-19
AD301	3301 MLT - 301 Program Copy Routine	IV-149
ALLOC	3488 Data File Allocator	IV-73
ASY01	3301 Assembly	IV-2
CLGEN	Call Library Generator	IV-56
COBOL	3301 COBOL Compiler - Single Compilation	IV-60

RCA 3301 SERVICE ROUTINE INDEX (Cont'd)

<u>Process ID</u>	<u>Title of Routine</u>	<u>Page No.</u>
COBOL	3301 COBOL Compiler - Stacked Compilation	IV-72B
CRDTP	Unbatched Card to Tape/Printer	IV-50
CTTV1	Variable Length Record Card to Tape	IV-52
© FLPRG	3488 Flaw Purge	IV-76
FORTR	3301 Fortran IV	IV-95
LCSSR	Calculate Drum Space	IV-154
LDTTD	Drum to Tape Dump	IV-158
LPTSR	Process Transcriber	IV-156
MAINT	Tape File Maintenance	IV-115
MGINT	3488 Magazine Initializer	IV-77
MLTCR	MLT Correct and Edit	IV-140
MLTDE	MLT Delete	IV-58
PDDUP	Peripheral Device Duplicate	IV-23
PLTMG	PLT/MLT Merge	IV-27
PRGN9	Process Generator	IV-29
PTEXT	Process/Task Extract	IV-145
PTMLT	MLT Patch	IV-21
RENAM	Rename	IV-54
RSSMS	Sort/Merge System	IV-37
STACK	3301/1401 Stacking	P-1
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SYSGN	System Tape Generator	IV-90
TCOMP	Tape Compare	IV-44
TPP01	Tape to Printer Punch	IV-110
TPPRT	Tape Print	IV-49
TRANS	3301/1401 Translator	N-1
TSKGN	Task Generator	IV-105

RCA 3301 SERVICE ROUTINE INDEX (Cont'd)

<u>Process ID</u>	<u>Title of Routine</u>	<u>Page No.</u>
UTRPT	3488 Utilization Report	IV-102
ZSY01	20K Assembly (40K Processor)	IV-2

©

3301 ASSEMBLY (ASY01)

1. Function

The RCA 3301 Assembly translates symbolic-coded programs into machine-coded programs for execution with the RCA 3301 Operating System.

2. Specifications

- a. Source input may be on cards, magnetic tape, or paper tape.

Cards - 80-character records.

Magnetic tape - 80-character records.

Paper tape - variable-length records (ISS preceding each field and record gap after last field, i.e., Reference Key Field).

Messages must be arranged as outlined below:

- input format* {
- 1) Message 1 - E/F (omitted if from card reader).
 - 2) Message 2 - Source language START entry.
 - 3) Message 3 to n - Source language through source language END entry.
 - 4) Succeeding messages will be a repeat of messages 2 and 3 above if assembling a batch of programs (limit of 99 programs per batch).
 - 5) Final message - E/F.

- b. Reassembly input may be magnetic tape or paper tape (180-character records) with a standard label.

Corrections must accompany a reassembly. If no actual corrections are to be made, a STARTC and ENDC are still necessary.

An Error printout will be produced during reassembly even if no errors exist in the correction deck. This printout serves to document which programs were reassembled. The STARTC and ENDC parameters always appear on this printout.

- c. Correction input may be cards or magnetic tape and can be applied to source or reassembly input. The same file standards that apply to source input also apply to correction input except that STARTC and ENDC entries are required instead of START and END entries.

- d. If a reassembly input tape contains multiple programs, only these programs with a corresponding correction deck will appear on the output PLT. (Corrections must be applied to at least one program when a reassembly tape is used as input.)

3. Device Assignment

Four work tapes a printer and a card reader (or optional tape station) are always required.

Logical Device Number	File Name	SEG. No.	SEQ No.	Remarks
01	_SOURCE_	AS	ID	Device reflecting source input. Initially assigned as card reader, but also may be a tape. When performing a <u>reassembly</u> , this device <u>must be a tape</u> . If AWK1 is not assigned then ASID (Source Input) must be a tape and an option to save the source will be initiated. ASID (Source Input) will contain the final PLT output, if no AWK1 is assigned.
02	OWK_TP_1	AW	K1	Tape reflecting final PLT output when assigned. Required when ASID (Source Input) is assigned to the card reader.
03	O_REASSY	AR	AS	Tape reflecting the reassembly output. When AWK2 is not assigned, an option to save the reassembly output will be initiated since ARAS will double as a work tape.
04	OWK_TP_2	AW	K2	Tape reflecting a work tape. Required when ARAS is not assigned, otherwise optional.
05	*OCALL_L1	AC	LD	Tape reflecting the CALL library file. When AWK3 is not assigned, an option to save the CALL library will be initiated since ACLD (CALL Library) will double as a work tape.
06	OWK_TP_3	AW	K3	Tape reflecting a work tape. Required when ACLD (CALL Library) is not assigned, otherwise optional.
07	CORRN_	AC	RN	Device reflecting <u>correction</u> input. Can be either the card reader or a tape. Corrections can be applied to either an initial source input or a reassembly source input.
10	_WK_TP_4	AW	K4	Tape reflecting a work tape. Always required.

THE INPUT TO PRG4N9

TO BE SAVED AS THE INPUT TO THE NEXT REASSEMBLY

Logical Device Number	File Name	SEG No.	SEQ No.	Remarks
50	_ASY_LST	AL	ST	Device reflecting assembly listing. Initially assigned as printer.
44	*OFORTRAN	AF	OP	Device reflecting FORTRAN output. Initially assigned as card punch. If tape output is desired and AFOP (FORTRAN output) is not assigned, then FORTRAN output will be the tape assigned for the normal PLT output (either AWK1 or ASID whichever is applicable).

*DEVPAR's for these devices are not preset, and DEVPAR must be entered at object time.

When the following typeout occurs:

ASY01_TYPE_IN_CHANGES

The following may be done:

- a. When corrections are not being applied (or reassembly input is not being used as source) type in

ACRN_NONE

- b. When a tape is not available for reassembly output or reassembly output is not desired, type in

ARAS_NONE

When a tape is not available for reassembly output but reassembly output is desired then type in

AWK2_NONE

- c. When devices are not assigned to the desired units, type in appropriate device changes (see page II-5 for format).
- d. When the changes have been typed in, then type in

02.

The following typeout occurs and the assembly continues automatically:

ASY01_PLT_OUTPUT_ON_ADxx

Where xx is the actual device to receive the PLT output, (this will be the device specified for AWK1 or ASID or AFOP).

4. Process ID-ASY01

5. Parameters

The following are fixed and require no parameter modification:

- a. Source input is 80-character fixed format.
- b. Labels are omitted on source input.
- c. Input reference keys are to be retained for a single program or the first program of a batch, and new reference keys are to be assigned for subsequent programs.
- d. Symbolic Name Listing is desired for 1st program, and no listing for subsequent programs if batched.
- e. Cross Reference Listing is desired for 1st program, and no listing for subsequent programs if batched.
- f. No library calls appear in the programs.
- g. Standard PLT format is desired.
- h. No input sort is desired.

If other than the fixed functions are desired, specific parameters must be entered. These parameters are INFPAR's, DEVPAR's, and LABPAR's.

- X a. Batch INFPAR parameter to be inserted regardless of the number of programs to be assembled. (See Operating System Manual Section VIII for INFPAR format.) (C)

Columns 1-6 - must contain 010203.

Columns 13-18 - must contain 000000.

Column 19 - must be a space.

Columns 20-22 - the XYZ parameter characters.

X = Input format indicator:

0 or SP = 80-character fixed, unbatched.

1 = 80-character variable, unbatched.

A = Reassembly.

Y = Input Sort Option for source input
(not correction).

0 or Sp = not to be sorted.

1 = to be sorted.

Z = PLT Format Indicator.

0 or SP = normal type PLT format desired.

1 = FORTRAN Card Library output (binary).

A = FORTRAN Card Library output (translate).

Ⓒ X b. Program INFPAR Parameters (see Operating System Manual Section VIII for INFPAR format).

Columns 1-4 - must contain 0103.

Columns 5-6 - the XX parameter characters.

XX = number of columns used for program parameters on this card; equals six characters per program.

Columns 13-18 - the YYYYYY parameter characters.

YYYYYY = 000000 for first program parameters; for subsequent program parameter cards, this entry will be the sum of the contents of col. 13-18 and col. 5-6 of the previous program parameter INFPAR card.

Column 19 - must be a space.

Columns 20-21 - the ZZ parameter characters.

ZZ = sequential program number to which the INFPAR parameters apply. This number may be from 01 to 99. Subsequent cards may be inserted even though a prior card had less than eight entries.

Columns 22-25 - the A B C D parameter characters.

A = CALL Insertion Indicator:

0 or Sp = generate new CALL insertions if any CALLs are made.

1 = maintain old CALL insertions if any are in source input.

B = Reference Key Indicator:

0 or Sp = generate new Reference Keys.

1 = maintain input Reference key.

C = Symbolic Tag Listing Indicators:

0 or Sp = listing not desired.

1 = listing desired.

D = Cross Reference Listing Indicator:

0 or Sp = listing not desired.

1 = listing is desired.

Note: Up to eight sets of entries (one per program) may be made on each INFPAR (Program Parameter card), where column ZZABCD information is repeated in columns 26-31, 32-37, 38-43, etc.

c. DEVPAR parameters (see Operating System Manual Section VIII for DEVPAR format). (C)

1) If a CALL library is to be used enter the following DEVPAR:

Columns 1-4 - must contain ACLD.

Columns 13-18 - must be spaces.

Column 19 - must contain C.

Column 20 - must be a space.

Column 21 - must contain A.

Column 22 - must be a space.

Column 23 - must contain a comma.

Column 24-26 - contain the DDD characters, where DDD = Descriptive block.

Column 27 - must contain a virgule (/).

Columns 28-29 - contain the AA characters, where AA = the actual device.

Column 30 - must contain a virgule (/).

Columns 31-38 - must contain the file ID (LIBGENTR is the standard file ID generated by the CALL Library Generator).

2) If FORTRAN output is desired enter the following DEVPAR:

- Columns 1-4 - must contain AFOP.
- Columns 13-18 - must be spaces.
- Column 19 - must contain C.
- Column 20 - must be a space.
- Column 21 - must contain A.
- Column 22 - must be a space.
- Column 23 - must contain a comma.
- Columns 24-26 - contain the DDD characters, where DDD = Descriptive block.
- Column 27 - must contain a virgule (/).
- Columns 28-29 - contain the AA characters, where AA = the actual device.
- Column 30 - must contain a virgule (/).
- Columns 31-38 - must contain OFORTRAN.

©

d. LABPAR parameters (see Operating System Manual Section VIII for LABPAR format).

1) If the label for the CALL library contains the standard file ID (i.e., LIBGENTR) no LABPAR is required. If the label contains some other file ID enter the following LABPAR:

- Columns 1-4 - must contain ACLD.
- Columns 13-19 - must be spaces.
- Columns 20-21 - must contain SS.
- Column 22 - must be a space.
- Columns 23-30 - contain the XXXXXXXX characters, where XXXXXXXX is the nonstandard CALL library file ID.

2) If corrections are to be applied and there is a label on the correction file enter the following LABPAR:

- Columns 1-4 - must contain ACRN.
- Columns 13-19 - must be spaces.
- Columns 20-21 - must contain SS.

Column 22 - must be a space.

Columns 23-30 - contain the XXXXXXXX characters, where XXXXXXXX is the file ID.

- 3) If a unique label is desired for the reassembly output tape enter the following LABPAR:

Columns 1-4 - must contain ARAS.

Columns 13-19 - must be spaces.

Columns 20-21 - must contain SS

Column 22 - must be a space.

Columns 23-30 - contain the XXXXXXXX characters, where XXXXXXXX is the file ID.

Column 31 - must be a space.

Columns 32-34 - contain the YYY characters, where YYY is the active time.

Note: If no LABPAR is entered, a generalized label will be generated (i.e., XXXXXARS, where XXXXX is the five-character program ID of the first program assembled).

- 4) If the source input or reassembly source input has labels enter the following LABPAR:

Columns 1-4 - must contain ASID.

Columns 13-19 - must be spaces.

Columns 20-21 - must contain SS.

Column 22 - must be a space.

Columns 23-30 - contain the XXXXXXXX characters, where XXXXXXXX is the file ID.

Column 31 - must be a space.

Columns 32-34 - contain the YYY characters, where YYY is the active time.

6. Typeouts - Normal and Error

All halts and error typeouts in the 3301 Assembly conform to the normal 3301 error typeout standards. The format for these typeouts is as follows;

ASY01_ *0Afssnn_ xx

Where:

- ASY01 = the process ID of the assembly system.
- . 0 = PIN op code.
- A = the software type code for the assembly system.
- f = the function code:
 - "1" indicates an error which is nonrecoverable.
 - "2" indicates an error for which the assembly system will attempt to compensate.
 - "3" indicates an error resulting from an I/O error.
- ss = The subfunction code that indicates the pass or phase within the assembly system where the error was detected.
- nn = the message number.
- xx = the optional additional information such as device number.

When a message is displayed on the typewriter to clarify an error condition, it precedes the error typeout or halt.

6. Typeouts - Normal and Error (Cont'd)

MESSAGE		MEANING	ACTION
PREFIX	CODE		
ASY01_	A10101	No "_SOURCE_"DEVPAR entry.	Restart Assembly with DEVPAR.
ASY01_	A10112	"_SOURCE_" not a tape station and no "O_WK_TP1" entry.	
ASY01_	A10113	No "O_REASSY" or "C_WK_TP2" DEVPAR entry.	
ASY01_	A10114	No "O_CALL_L" or "O_WK_TP3" DEVPAR entry.	Restart Assembly with correct DEVPAR.
ASY01_	A10115	No "_WK_TP_4" DEVPAR entry.	
ASY01_	A10116	No "_ASY_LST" DEVPAR entry.	
ASY01_	A10117	No "O_CORRN_" DEVPAR when input format is reassembly.	Correct control information and restart Assembly.
ASY01_	A10118	"OWK_TK_1" and "WK_TP_4" are selecting the same device.	
ASY01_	A10119 A10120	Assembly process segment description table in error.	
ASY01_	A10604 A10605 A10606 A10607	Assembly error.	Record all machine registers, memory and work tapes.
ASY01_	A11001	Reassembly input does not have LABPAR specified.	Restart assembly.
ASY01_	A11002 A11003 A11004	Assembly error.	Record all machine registers, memory and work tapes.
ASY01_	A11201	Source input tape format error to assembly CALL pass.	Retranscribe or redefine source input tape.
ASY01_	A11504	A START, NAME, SGMT, or SEQ entry has been found after a DEFSEQ and before an END entry.	Continue and the entry will be treated as an illegal op code.
ASY01_	A13001	Tape error. E/F is missing as first block on tape.	Examine work tapes and remove bad tape. Restart assembly.

5. Typecuts - Normal and Error (Cont'd)

MESSAGE		MEANING	ACTION
PREFIX	CODE		
ASY01_	A13101 A13102	Tape error. E/F is missing as first block on tape.	Examine work tapes and remove bad tape. Restart assembly.
ASY01_	A13103	Tape error. Abnormal return from tape read.	Examine work tapes and remove bad tape. Restart assembly.
ASY01_	A13104	Assembly illogical error.	Record all machine registers, memory and all work tapes.
ASY01_	A13620	The assembly system has encountered a block of data which has an indeterminate format.	Record all registers, memory and all work tapes.
ASY01_	A21502	Source input has an "END" entry not followed by a "START" or E/F.	Continue to bypass until a "START" or E/F is found.
ASY01_	A21503	Program ID number not in ascending order.	Assembly will continue but nonsequential. PLT will be generated.
ASY01_	A22501	Sequence XXXX does not exist for DEFSEQ.	
ASY01_	A23601	A device sequence has been defined as a DEFSEQ 4.	Sequence is ignored.
ASY01_	A23602 XX	SEQ XX is duplicated sequence number.	Sequence is ignored.
ASY01_	A23603 XXXXXX	SEQ XXXXXX has duplicate sequence name.	Sequence is ignored.
ASY01_	A23604 XXXXXX	A DEFSEQ does not exist for SEQ XXXXXX.	Sequence is ignored.
ASY01_	A23614 XXXXXX	Exit reference XXXXXX refers to nonexisting sequence.	Exit reference is ignored.
ASY01_	A23615 XXXXXX	XXXXXX exit symbol has not been defined.	Exit symbol is ignored.
ASY01_	A3010001	Batch parameters format error.	Assembly continues using assumed parameters.
ASY01_	A3010002	Program parameter format error.	

6. Typeouts - Normal and Error (Cont'd)

MESSAGE		MEANING	ACTION
PREFIX	CODE		
ASY01_	A3010003	Batch parameters have invalid characters. XYZ = batch parameter characters, one or more are in error.	Space is assumed.
ASY01_	A3010004	No program parameter entries.	
ASY01_	A3010005	Sequential program number not 01-99 (ZZ is in error).	Parameter is bypassed.
ASY01_	A3010006	Program parameters have valid characters. ABCD = Program Parameters, one or more are in error.	Space is assumed.
ASY01_	A3010022	Option to sort input "yes" when input format is re-assembly.	Assembly continues and assumes input not to be sorted.
ASY01_	A30601 A30602	Tape Error. E/F is missing as first block.	Examine work tapes and remove bad tape. Restart assembly.
	A30603 A30606	Tape Error. Abnormal return from tape read.	Remove bad Tape. Restart assembly.
ASY01_	A32501	Abnormal error has been received from tape station indicating a write beyond the end of the physical reel.	Use another tape station and restart assembly. (A)
ASY01_	A33002	Tape Error. E/F is missing as first block on tape.	Examine work tapes and remove bad tape. Restart assembly.
ASY01_	A33003	Tape error. Abnormal return from tape read.	Examine work tape and remove bad tape. Restart assembly.
ASY01_	A33004 A33005 A33006 A33007	Assembly error. An illogical block of data has been created.	Record all machine registers, memory and all work tapes.
ASY01_	A33605 A33606 A33610 A33616	Abnormal error return after tape read.	Examine work tapes and remove bad tape. Restart assembly.
ASY01_	A34501XX	Tape error on device XX.	Remove Tape and restart assembly.

6. Typeouts - Normal and Error (Cont'd)

MESSAGE		MEANING	ACTION
PREFIX	CODE		
ASY01_	A35001 A35002 A35003 A35004 A35005 A35006 A35007 A35201 A35202 A35401 A35402 A35403 A35404 A35405 A35406 A35407 A36001 A36002	Tape error. Device indicated by associated message.	Remove Tape and Restart assembly.

The messages:

ASY01 A36502
ASY01 A36503
ASY01 A36504

Are replaced by:

ASY01 A36501XX
ASY01 A36602XX
ASY01 A366XXYY

Where XX is the tape drive causing the error. ASY01 A366XXYY indicates either tape drive XX or tape drive YY has been mispositioned due to a machine malfunction.

ASY01_	02 to continue *OSAVEASID.	grammer to save the source input tape.	contained source input, then type in "02" to continue assembly. Note if source input is not dismounted it will be used as a work tape.
ASY01_	Replace tape X to save CALL_L input	Self-explanatory.	
ASY01_	02 to continue *OSAVEACLD.		
ASY01_	Replace tape X to save REASM output	Self-explanatory.	
ASY01_	02 to continue		

The following error messages appear on the "Correction Error List." These messages are a result of errors encountered during the correction phase of the assembler and are displayed on the printer (or substitute device).

MESSAGE	MEANING	ACTION
CORRECTION EXPECTED "STARTC" (80-character correction).	No STARTC entry was found at either the beginning of the correction file or im- mediately after an ENDC entry.	This entry bypassed.
START HAS SPACES IN REFERENCE KEY (80- character correction).	This entry has all spaces in the reference key.	All zeroes (seven zeroes) are assumed.
NO "ENDC" BEFORE NEXT "STARTC" (80-character correction).	Reached STARTC entry be- fore reaching an ENDC entry.	ENDC assumed before STARTC reached.
NO "ENDC" CORRECTION BEFORE EF.	Last entry on correction file not an ENDC.	ENDC assumed.
ASSEMBLY IN ERROR, NO "END" BEFORE "START".	Reached START entry before reaching an END entry.	END assumed before START reached.
ASSEMBLY IN ERROR, NO "END" BEFORE EF.	Last entry on reassembly/ source file not an END.	END assumed.
REMOVED "END", PROGRAM # "XXXXX".	A REMOVE correction has a range that exceeds the program.	The output program will not contain an END entry.
PROGRAM NOT FOUND ON BALANCE OF REASSEMBLY TAPE.	STARTC out of order by program identification or program identification not on reassembly or source file.	This entry bypassed.
NO PROGRAMS ON OUTPUT ASSEMBLY TAPE.	Program identifications on STARTC entries do not match an identification in the START entries on the reassembly/source file.	Restart assembly with proper entries.
THIS CORRECTION NOT PROCESSED_80-char- acter).	This correction not applied because E/F, last END, or current END on reassembly/ source file was reached.	This entry bypassed.

Error Messages (Cont'd.)

MESSAGE	MEANING	ACTION
CORRECTION HAS SPACES IN REFERENCE KEY_(80-character correction).	An Insertion or Replacement correction has seven spaces in the Reference Key.	This entry bypassed.
CORRECTION REFERENCE KEY IN ERROR_(80-character correction).	A REMOVE correction, either has all spaces in column 20-26 or the Reference Key in columns 20-26 is larger than the Reference Key in columns 28-34.	
REFERENCE KEY NOT IN PROGRAM_(80-character correction).	A REMOVE correction entry has a Reference Key not found in sequential order in the source/reassembly file.	
INCORRECT REMOVE CORRECTION_(80-character correction).	This REMOVE entry specifies a range where no entries appear on the reassembly/source file.	
PROG. ENTRY NOT IN SEQUENTIAL ORDER_(80-character program entry).	The Reference Key in the reassembly source entry is either lower than or equal to the Reference Key in the previous entry. (No sequence check on entries with all spaces in the Reference Key.)	Entry treated as if in sequence.
COER. ENTRY NOT IN SEQUENTIAL ORDER_(80-character correction).	The Reference Key in this correction entry is either lower than or equal to the Reference Key in the previous correction entry.	Entry is treated as if it were in sequence.

Page IV-15A deleted by revision 11/65.

Pages IV-16, IV-17, and IV-18 deleted
by revision 10/65.

(Pages IV-16, IV-17, and IV-18 deleted
by revision 10/65)

MLT ABSTRACT LISTING (ABMLT)

1. Function

This routine prints on the on-line printer or writes to magnetic tape a summary of the tasks and processes contained on an MLT.

2. Specifications

Refer to Service Routine Library (94-30-002).

Ⓐ

- a. The listing reflects the MLT label, the actual block number of the ID blocks being listed, all E/F's and the E/D at the end of the tape.
- b. The MLT is rewound at the beginning and at the termination of the process.
- c. Three separate options are available:

Option 1:

Task ID's and Process ID's are listed.

Option 2:

Task ID's, Process ID's, and Segment ID's are listed. The Segment ID is indented ten characters to the right of the Process and Task ID's.

Option 3:

Task ID's, Process ID's, Segment ID's and Sequence ID's are listed. The Sequence ID is indented ten characters to the right of the Segment ID.

- d. Input may be either a two-tape or one-tape system. If 301 PLT is present, the abstract will reflect "301 PLT" and list the "PS" blocks.

3. Device Assignments

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01	_IP_TAPE	01	01
50	_OP_PRNT	01	02

4. Process ID - ABMLT

5. Parameter:

- X
X = 1 (Task and Process ID's)
2 (Task, Process and Segment ID's)
3 (Task, Process, Segment and Sequence ID's)

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6. Timeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATE		
ABMLT	B40301	INSERT PARAMETER	Parameter Type Request.	Refer to Parameter, Page IV-19.
ABMLT	B40302		Low paper has been detected.	Replenish supply, type in 2 to continue.
ABMLT	B40303		ETW sensed on output.	Replace with new output reel, type in 2 to continue.
ABMLT	B40304		Invalid parameter. Option 1 is assumed.	None.
ABMLT	B40377		Nonrecoverable error has occurred on input or output device.	Process is terminated.
ABMLT	B40388	INV_REPLY	Invalid response to previous message	Type in correct response to previous error message.
ABMLT	B40399	END_OF_RUN	End of process	None.

MLT PATCH ROUTINE (PTMLT)

1. Function

This routine applies patches to an MLT by reading cards, batching them six to a block, and writing these blocks on the MLT at the end of the segment being patched.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

(A)

- a. The format of patch cards follows standard card patch formats. (See console routine 12.) The patches must be in ascending order by Process/Segment ID and must be followed by a card containing "STOP" in columns 1 through 4.
- b. When patch cards are on tape, they are to be unbatched with no labels or sentinels preceding them.
- c. If the printer is available, applied patches also will be listed.
- d. If the input is a One-Tape System, an interspersed overlay will be inserted before the first patch block of the segment being patched.
- e. BTL and E/F will always be present at the beginning of the output MLT. If a One-Tape System is input the output will contain the 250 character BTL with only the date changed.
- f. The output will always end with the following:

SM00000000
EF
ETL
EF
ED

3. Device Assignments

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seq. No.</u>	<u>Seq. No.</u>
50	QOP_PRNT	01	04
01	_IP_TAPE	01	01
02	_OP_TAPE	01	02
40	_IP_CARD	01	03

4. Process ID - PTMLT

5. Parameter: none

Format of input is same as 12 console route

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6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PTMLT	B40601		Columns 1-3 contain something other than 11A, 11I, 11D, 12A, 12I, or 12D.	Card bypassed and next card is read.
PTMLT	B40602		First card is a continuation card.	Card bypassed and next card is read.
PTMLT	B40603		First card has "STOP" in columns 1 through 4.	Run is terminated.
PTMLT	B40604		Patch cards are not in ascending order by Process/Segment ID.	Card is bypassed and next card is read.
PTMLT	B40605		Process/Segment ID in patch card not found on input tape.	Card is bypassed and next card is read.
PTMLT	B40606		E/F on input tape has been sensed before STOP card has been read.	Remaining cards are not processed; preceding cards are batched and written to output. Run is terminated.
PTMLT	B40607		Input tape has BTL but no E/F	None.
PTMLT	B40608		Input tape starts with an E/F.	None.
PTMLT	B40609		Input tape has no BTL or E/F.	None.
PTMLT	B40610		Output tape block count does not validate.	None. Run is terminated.
PTMLT	B40677		Abnormal termination.	Run is terminated.
PTMLT	B40699	END_OF_RUN	Run terminated.	None.

*When output is magnetic - 150 is written after each duplication
The tape is then read again so that it is positioned after
the last block duplicated before the next parameter is
PERIPHERAL DEVICE DUPLICATE ROUTINE (PDDUP) requested.*

1. Function

The basic function of this routine is to copy data from one magnetic tape to another magnetic tape. However, other peripheral devices may be employed when specified by the user. In the event the devices are magnetic or paper tape, positioning of blocks, E/F's and/or E/D's before, after and in-between duplication is possible.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

(A)

When only magnetic tape is utilized, a specified number of blocks, E/F's or E/D's may be copied. The maximum block size that can be copied is 8,000 characters when the output is to be verified by reverse reading. When verification is not desired, the maximum block size may be 16,000 characters.

When the amount of data to be copied is not specified by a parameter, the routine assumes that data terminated by an E/D is to be copied and verification will not be performed.

The routine does not provide label processing.

In addition to magnetic tape, this routine may use a card reader or paper tape reader as an input device, and the card punch, paper tape punch, printer, or Console Typewriter as an output device. Verification is not possible when any device other than magnetic tape is employed.

Various degrees of transcription are possible depending upon the devices utilized. The combinations, with limitations, follow:

Magnetic Tape Input

Blocks up to 16,000 characters in length may be transcribed to magnetic tape, paper tape, or to the Console Typewriter.

When input blocks contain characters in excess of the output-device, single-record capacity, the balance of the characters in the input block are bypassed; (i.e., print characters in excess of 120/160, card-punch characters in excess of 80/160).

When input blocks do not contain (120/160) print characters, or 80 (160-binary) punch characters, the balance of the print line or punch card is space filled.

Punched Card Input

80-(or 160) character records are written to magnetic tape, to another card, to paper tape, or to the printer. The balance of the print records of cards read in the translate mode are space filled; binary records printed on a 120-character printer are truncated.

However, when column one (1) of a card contains an E/F or E/D and the balance of the card is blank, single-character sentinels are written to magnetic or paper tape.

When binary cards are specified either the reader or the punch device(s) must be primed at device assignment time.

Paper Tape Input

Records up to 16,000 characters in length will be written to magnetic tape, paper tape, or to the Console Typewriter.

When input blocks contain characters in excess of the output-device, single-record capacity, for translate or binary mode respectively, the balance of the characters in the input block are not printed (i.e., print characters in excess of 120/160, card-punch characters in excess of 80/160).

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01	<u>INPUT</u>	01	01
02	<u>OUTPUT</u>	01	02

4. Process ID - PDDUP

5. Parameters:

a. PDDUP INSERT PARAMETERS

$\left[\left\{ \text{nnnn_t} \right\} \left\{ \text{v} \right\} \right]$

where nnnn = number of blocks, E/F's, or E/D's to be duplicated
t = B - blocks
F - E/F's
D - E/D's
, = comma for readability
v = verification

b. STOP = Terminates process and rewinds input tapes.

c. $\left[\text{POSIX} \left\{ \begin{array}{c} \text{FBL} \\ \text{FEF} \\ \text{FED} \\ \text{RBL} \\ \text{REF} \\ \text{RED} \\ \text{BTC} \end{array} \right\} \text{N..N} , \left\{ \begin{array}{c} \text{FBL} \\ \text{FEF} \\ \text{FED} \\ \text{RBL} \\ \text{REF} \\ \text{RED} \end{array} \right\} \text{N..N} , \left\{ \begin{array}{c} \text{FBL} \\ \text{FEF} \\ \text{FED} \\ \text{RBL} \\ \text{REF} \\ \text{RED} \end{array} \right\} \text{N..N} ; \text{POSIY....} \right]$

POSI = positioning parameter

X = 1 for logical tape 01

Y = 2 for logical tape 02

FBL = read forward blocks

FEF = read forward E/F's

FED = read forward E/D's

RBL = read reverse blocks

REF = read reverse E/F's

RED = read reverse E/D's

BTC = rewind the tape

, = separates positioning parameters for the same tape.

; = indicates positioning for next tape.

N..N (variable - 1 to 4 characters) specifies the number of blocks or sentinels.

d. POSIXEQUVVVVVVVV

POSI = position
 X = 1 for logical tape 01
 = 2 for logical tape 02
 EQU = equality constant
 VVVVVVVVVV = first 10 characters of the block desired

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PDDUP	B30001	INSERT_PARAMETER	Parameters are required.	Refer to step 5.
PDDUP	B30002		Verification unsuccessful.	None. Process Restarts.
PDDUP	B30003		Verification was not attempted due to one of the devices being unable to be read in reverse (printer, card reader, or card punch). The duplication is completed.	None. Process Restarts.
PDDUP	B30004		Bad parameter was typed in.	Type correct parameter.
PDDUP	B30005		Bad PØSI parameter in character positions 6-8.	Type correct parameter.
PDDUP	B30006		Bad PØSI parameter, missing comma or semi-colon.	Type correct parameter. If multiple positioning has been specified, all positioning has been done up to incorrect part of message.
PDDUP	B30007	TAPE_OX POS:	Tapes have been positioned as specified.	None.
PDDUP	B30008		An E/D has been reached before 10-character equality.	Type in Ø to terminate, 2 to continue. The response of "2" allows one of the following to be entered:

(Continued)

6. Timeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PDDUP	B30008 (Cont'd)			(a) a POSSI parameter. (b) a POSIEQU parameter. (c) a STOP parameter.
PDDUP	B30009		Input block exceeds 16,000 characters.	None. Process terminates.
PDDUP	B30010		Duplication complete. Blocks too large for verification.	None. Process restarts.
PDDUP	B30055	DUPLICATION_COMPLETED	Duplication has been done.	None. Process continues.
PDDUP	B30066	VERIFY_COMPLETE	Verification has been done.	None. Process continues.
(A) PDDUP	B30071		An inoperable condition has been sensed by the output device.	Determine cause of inoperable condition and correct it, if possible, then type in: 0 to terminate 1 to continue process.
PDDUP	B30072		ETW has been sensed by the tape station assigned to receive output.	Type in: 0 to terminate 1 to continue writing to physical end of tape.
(A) PDDUP	B30073		An inoperable condition has been sensed on the card reader.	Correct condition, if possible, and then type in: 0 to terminate 1 to continue process
(C) PDDUP	B30077		Abnormal termination has occurred on either the input or output device.	None. Process restarts.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PDDUP	B30088	INV_REPLY	Reply to the previous typeout was invalid.	Type in correct reply.
PDDUP	B30099	END_OF_RUN	End of process.	None. Process terminates.

PLT/MLT MERGE (PLTMG)

1. Function

This routine merges two or three Program Library Tapes generated by the RCA 3301 Assembly System, or two or three Master Library Tapes. It will also accept the One-Tape System as input.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

(A)

- a. A maximum of three inputs can be accepted.
- b. Program Library Tapes will be merged by segment ID's only.
- c. Master Library Tapes or the One-Tape System can be merged by segment ID's or Process ID's by use of a parameter.
- d. A merge of MLT's or One-Tape Systems produces an MLT as the output.
- e. If MLT's or One Tape Systems are being merged, the output will end with the following:

SIY 0000000, EF, ETL, EF and ED.

- f. When ID's are found to be equal, a message will be typed out indicating equality and which tape was bypassed.

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01	_1P_TP_1	01	01
02	_1P_TP_2	01	02
03	01P_TP_3	01	03
04	_OP_TAPE	01	04

4. Process ID - PLTMG

5. Parameters

Position	1	2	3	4	5
	S	-	-	-	-
	P	N	N	N	N

Position 1 = a space or S indicates merge by segments.
A P indicates process ID merge.

2 to 5 = a space indicates rewind at termination.
An N indicates no rewind.

17273
input 1 is preferred &
bypass 2 or 3
2 is secondary
3 is tertiary
June 1967

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PLTMG	B40401	INSERT PARAMETER	Type parameter.	Refer to parameters, paragraph 5.
PLTMG	B40402		First input tape starts with an E/F.	None. Processing continues.
PLTMG	B40403		First input tape has no BTL or E/F.	None. Processing continues.
PLTMG	B40404		ETW sensed on the output tape before merge is completed.	Run is terminated. Mount new output tape and restart process.
PLTMG	B40405	XXXXXXX	Task ID, process ID, or segment ID blocks on input tapes 1 and 2 were found to be equal. The task, process, or segment on input tape 2 was bypassed. XXXXXXX=task, process or segment ID.	None. Processing continues.
PLTMG	B40406	XXXXXXX	Task ID, process ID, or segment ID blocks on input tapes 2 and 3 were found to be equal. The task, process, or segment on input tape 3 was bypassed. XXXXXXX=task, process, or segment ID.	None. Processing continues.
PLTMG	B40407	XXXXXXX	Task ID, process ID, or segment ID blocks on input tapes 1 and 3 were found to be equal. The task, process or segment on input tape 3 was bypassed. XXXXXXX=task, process, or segment ID.	None. Processing continues.

6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PLTMG	B40408		First input tape has BTL but no E/F.	None. Processing continues.
PLTMG	B40409		Invalid parameter used.	Type in correct parameter.
PLTMG	B40477		Nonrecoverable I/O error has occurred.	Run is terminated. Restart process.
PLTMG	B40499	END OF RUN	Run terminated.	None.

1. Function

- a. Phase I of the Process Generator generates a process to be placed on an MLT. The process is generated from an assembly output (PLT) and user-supplied Process Description parameters. This phase also accepts several assemblies in batched format (on a single PLT) to produce several processes on a single output in MLT format. This phase also generates sort processes. An MLT containing the basic sort process is required as input in addition to Process Description parameters.
- b. Phase II of the Process Generator is used to merge two MLT's or MLST's or to generate an MLST (Master Library System Tape One Tape System). This phase can be entered directly from Phase I or may be utilized independent of Phase I.
 - 1) If Phase II is entered directly from Phase I, the user has two options when generating an MLST:
 - a) Generate an MLST utilizing only the output from Phase I (_GEN_MLT).
 - b) Generate an MLST utilizing the merge option which will merge generated output from Phase I (_GEN_MLT) with the MLT/MLST designated OIP_MLT.
 - 2) If Phase II is entered directly, the user may select:
 - a) The merge option to merge the generated MLT with the designated OIP_MLT and create an MLT.
 - b) Generate a MLST utilizing an MLT/MLST designated as GEN_MLT.
- c. Merge Option
 - 1) The Process Generator has the capability to merge using either segment and task ID's or process and task ID's as the merge criteria. The character placed in column 13 of the ENDP parameter card indicates the type of merge that the user desires. The "_GEN_MLT" is always primary input to the merge and the "OIP_MLT" is always secondary input.

2. Specifications

a. Labels on the MLT

When labels are desired on the MLT output from the Process Generator the following parameter must precede the first STARTP parameter:

C 2. Specifications (Cont'd)

<u>Columns</u>	<u>Description</u>
1-6	not used.
7-12	must contain "LABEL."
20-27	contains an eight-character identification.
28	blank.
29-34	purge date, if blank, 999999 will be assumed.
35-73	blank.
74-80	any identification.

If a LABEL parameter is not processed, the label ID will be "MLT 00000."

3. Device Assignments

a. Typeouts

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01	OIP_ASSY	01	10
02	_WK/1TPS	01	15
03	_GEN_MLT	01	20
04	OIP_MLT	01	95
05	_IP_PRAM	01	25
06	OOP_PRNT	01	30

b. Description

OIP_ASSY (Optional)

When an Assembly input is not present (i.e., generation of a sort process without merging own coding; generation of an MLST using an existing MLT as input; etc.), type: 0110_NONE.

WK/1TPS (Always Present)

This device functions as a work tape when the normal generation of a process is executed. This device also functions as the output when generating an MLST and when utilizing the merge option of PRGN9.

To facilitate copying the 301 PLT onto the end of an MLT/MLST, the following block appears after the last data block and before the E/F preceding the ETL.

SHH0000000

GEN_MLT (Always Present)

When a normal process generation is taking place, this device contains the generated MLT. When the generation of an MLST follows, this tape becomes input to Phase II.

b. Description (Cont'd)

When the creation of an MLST is required without the generation of processes, the previously generated MLT is mounted on this device.

To facilitate copying the 301 PLT onto the end of an MLT/MLST the following block appears after the last data block and before the E/F preceding the ETL.

SUM0000000

OIP_MLT (Optional)

This device is required when generating a sort process or when the merge option is selected. If neither of these functions is required, type: 0195_NONE.

IP_PRAM (Always Present)

This device contains the process descriptions.

OOP_PRNT (Optional)

This device provides a list of input parameters by process.

Note:

See charts on pages IV-30B and IV-30C.

4. Process Exit Information

The process exits within the Process Generator are as follows:

PROCESS EXIT NO.	TYPE OF EXIT	FUNCTION(S) FROM WHICH EXITING	PHASE FROM WHICH EXITING	MEANING
01	Normal	Generation of an MLT or generation of a sort/ merge process.	I	Phase I has terminated normally.
02	Normal	Merge and/or generation of an MLST.	II	Phase II has terminated normally.
03	Abnormal	Merge and/or generation of an MLST.	II	Phase II has terminated abnormally and the output may not be usable.
04	Abnormal	Generation of an MLT or generation of a sort/ merge process.	I	Phase I has terminated abnormally and the output may not be usable.

5. Process ID - PRGN9

6. Parameters. Refer to 3301 REALCOM Operating System Manual (Pub. #94-08-000).

FUNCTIONS TO BE PERFORMED DURING PROCESS GENERATION	FILE NAME			
	OIP ASSY(0110)	WK/1TPS(0115)	GEN MLT(0120)	OIP MLT(0195)
Generate an MLT	Input PLT	Work Tape	Output MLT	None
Create an MLST without generating processes.	None	Output MLST	Input MLT/MLST	None
Generate a sort/merge process.	Optional input Own-Code PLT	Work Tape	Output MLT	Basic sort/merge process MLT/MLST
Merge without generating processes.	None	Output MLT	<u>Primary</u> input MLT/MLST	<u>Secondary</u> input MLT/MLST
Generate an MLT and create an MLST.	Input PLT	Output MLST	Output MLT	None
Generate an MLT and merge with previously generated MLT/MLST producing MLT.	Input PLT	Output MLT (from merge)	Output MLT (from generation of an MLT; becomes <u>primary</u> input MLT to merge)	<u>Secondary</u> input MLT/MLST (to merge)
Generate an MLT and merge with previously generated MLT/MLST creating an MLST.	Input PLT	Output MLST (from merge and generation of an MLST)	Output MLT (from generation of an MLT; becomes <u>primary</u> input MLT to merge)	<u>Secondary</u> input MLT/MLST (to merge)
Merge previously generated MLT/MLST and create an MLST	None	Output MLST (from merge and generation of an MLST)	Primary input MLT/MLST	<u>Secondary</u> input MLT/MLST
Generate a sort/merge process and create an MLST.	Optional input Own-Code PLT	Output MLST	Output MLT	Basic sort/merge process MLT/MLST

FUNCTIONS TO BE PERFORMED DURING PROCESS GENERATION	FILE NAME			
	OIP ASSY(0110)	WK/1TPS(0115)	GEN MLT(0120)	OIP MLT(0195)
Generate a sort/merge process and merge with previously generated MLT/MLST producing an MLT.	Optional input Own-Code PLT	Output MLT (from merge)	Output MLT (from generation of a sort/merge process; becomes <u>primary</u> input MLT to merge)	1. Basic sort/merge process MLT/MLST (see note). 2. <u>Secondary</u> input MLT/MLST (to merge)
Generate a sort/merge process and merge with previously generated MLT/MLST creating an MLST.	Optional input Own-Code PLT	Output MLST (from merge and generation of an MLST)	Output MLT (from generation of a sort/merge process; becomes <u>primary</u> input MLT to merge)	1. Basic sort/merge process MLT/MLST (see note). 2. <u>Secondary</u> input MLT/MLST (to merge)

NOTE: After generation of the sort/merge process is completed, the following typeout occurs:

"B10055 REPLACE OPTIONAL MLT"

At this halt, the basic sort/merge process MLT/MLST can be dismounted if it is desired to merge the contents of a different tape. If this is so, the secondary input MLT/MLST must be mounted prior to continuing.

6. Timeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PRGN9	B10050		ETW has been sensed on the GEN MLT in Phase I.	None. Process is terminated.
PRGN9	B10055	_REPLACE_ OPTIONAL_MLT	The merge function is specified and a sort/merge process was generated in Phase I.	If it is desired not to merge the basic sort/merge process MLT/MLST (assigned as the OIP_MLT in Phase I), dismount the tape and mount the secondary input MLT/MLST (to the merge) on the same tape station. Then type in "Y" and depress RELEASE. If the basic sort/merge process MLT/MLST is to be merged, type in "N" and depress RELEASE.
PRGN9	B10066		An abnormal nonrecoverable termination has occurred on the printer.	Type in: 0 to terminate the process. 2 to continue processing without printing the remainder of process description parameters.
PRGN9	B10077		An abnormal nonrecoverable termination has occurred on one of the input/output devices.	None. Process is terminated.
PRGN9	B10077	X_CD*	A nonrecoverable abnormal termination has occurred. X = actual device number. CD = characters specifying the device termination conditions.	None. The process is terminated. For an explanation of the C and D characters, see the RCA 3301 Realcom Operating System Manual, pages V-48 (C character) and V-49 (D character).
PRGN9	B10088	INV_REPLY	Reply to the previous timeout was invalid.	Type in the correct reply to the previous timeout.
PRGN9	B10099	END_OF_RUN	End of Process Generation.	None. Process is completed.

*NOTE: This field (X_CD) will appear only when a nonrecoverable abnormal termination occurs while merging and/or generating an MLST. When generating an MLT or a sort/merge process, only the message "B10077" will be typed.

6. Typeouts - Normal and Error (Cont'd)

C	MESSAGE			MEANING	ACTION
	PREFIX	CODE	VARIABLE DATA		
	PRGN9	B100A1	(Card Image)	First parameter is not STARTP, ENDP, or LABEL.	Type in: 1 to continue after inserting correct parameter.
	PRGN9	B100A2	(Card Image)	First SGMT parameter contains spaces in cols. 1-2	Segment 01 is assumed and processing continues.
	PRGN9	B100A4	(Card Image)	Process Segment ID in cols. 1-2 of the parameter is unequal to Process Segment ID on the preceding SGMT parameter.	Parameter is ignored and processing continues.
	PRGN9	B100A5	(Card Image)	Cols. 7-12 of the parameter contain an invalid code.	Parameter is ignored and processing continues.
	PRGN9	B100A6	(Card Image)	Exit number in cols. 3-4 of PASSEQ parameter is unequal to exit number on the preceding SGEXIT parameter.	Parameter is ignored and processing continues.
	PRGN9	B100AA	(Card Image)	Segment being defined is not on the PLT.	All parameters for this segment are listed on the printer (if assigned) as being BYPASSED, and are ignored. Processing continues with the next SGMT, STARTP, or ENDP parameter.
	PRGN9	B100AD	(Card Image)	The parameter contains an invalid character in a six-character field that should be all numerics.	The field is zero filled and processing continues.
	PRGN9	B100B1	(Card Image)	Cols. 3-4 of the DEVPAR parameter contain the ID of a sequence that is not present in the segment specified in cols. 1-2.	Parameter is ignored and processing continues.
C					

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PRGN9	B100B4	(Card Image)	Process Segment ID in cols. 1-2 of the DEVPAR parameter is unequal to the ID of the segment being described.	Parameter is ignored and processing continues.
PRGN9	B100C1	(Card Image)	"Maximum number of sequences" entry (cols. 30-32) on STARTP parameter is spaces, zeros, or greater than 999.	30 sequences are assumed and processing continues.
PRGN9	B100C2	(Card Image)	"LHE/RHE indicator" (col. 33) on the STARTP parameter is other than L, R, or space.	"L" is assumed and processing continues.
PRGN9	B100C3	(Card Image)	"Orientation indicator" (col. 41) on the STARTP parameter is other than H, T, or space.	Space is assumed and processing continues.
PRGN9	B100C4	(Card Image)	"Minimum memory" entry (cols. 43-48) on the STARTP parameter contains spaces or zeroes.	15,000 characters are assumed as minimum, all of memory is assumed as maximum, and the "Maximum memory" entry (cols. 50-55) on the STARTP parameter is ignored. Processing continues.
PRGN9	B100C5	(Card Image)	"Maximum memory" entry (cols. 50-55) on the STARTP parameter contains zeroes.	Maximum memory desired is assumed equal to minimum memory specified, and processing continues.
PGRN9	B100C6	(Card Image)	"Maximum memory" entry (cols. 50-55) on the STARTP parameter is less than the minimum memory specified.	Maximum memory desired is assumed equal to minimum memory specified, and processing continues.

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PRGN9	B100C7	(Card Image)	"Segment load" indicator (col. 34) on the STARTP parameter is other than L, R, S, or space.	"L" is assumed and processing continues.
PRGN9	B100C8	(Card Image)	"Segment load" indicator is an "S" but sequence number in "Segment load address" entry (cols. 35-36) on SGEXIT parameter contains zeroes or spaces.	Spaces or zeroes as specified are assumed as the sequence number and processing continues. The parameter should be corrected and process generation rerun in order that an object time halt not occur when the nonexistent sequence number is encountered during segment loading.
PRGN9	B100C9	(Card Image)	Memory allocated within the Process Generation for storing sequence number and corresponding segment exit information has been exceeded for segment specified in cols. 1-2 of the SGEXIT parameter typed.	Remainder of SGEXIT parameters for the segment being described are ignored and processing continues.
PRGN9	B100CA	(Card Image)	Sequence number indicating the sequence containing the segment exit being described (cols. 45-64) on the SGEXIT parameter is spaces.	Parameter is ignored and processing continues.
PRGN9	B100CB	PPPPP_SS_QQ	Sequence number indicating the sequence containing the segment exit being described (cols. 46-64) on a SGEXIT parameter is not part of the segment being described. PPPPP=Process ID SS=Segment ID QQ=Sequence ID	The sequence ID in error is ignored and processing continues with the next sequence ID entry on the SGEXIT parameter.

<u>Prefix</u>	<u>Code</u>	<u>Variable Data</u>	<u>Meaning</u>	<u>Action</u>
PRGN9	B100CD	PPPPP_SS	More than 99 Segment Exit blocks appended. PPPPP = Process I.D. SS = Segment I.D.	Process indicated is not executable. The number of SEGKIT's in a seg- ment must be re- duced. Any other processes on this MLT are valid.

			storing this informa- tion. PPPP=Process ID SS=Segment ID QQ=Sequence ID	table is typed out and bypassed. That which does fit, is placed within the table. Processing continues.
PRGN9	B100D1	(Card Image)	A DRMPAR parameter is in the wrong location with- in the process des- cription parameters.	Parameter is ignored and processing con- tinues.
PRGN9	B100D2	(Card Image)	"Drum assignment" entry (col. 19) on the STARTP parameter is other than D or space.	"Drum assignment" entry is ignored and pro- cessing continues.
PRGN9	B100D5	(Card Image)	More than one DEVTAB parameter was entered for the process.	Parameter is ignored and processing con- tinues.
PRGN9	B100H1	(Card Image)	"Halt Code" entry (col. 13) on STARTP param- eter is other than H or space.	Space is assumed and processing continues.
PRGN9	B100I1	(Card Image)	Process Segment ID in cols. 1-2 of the INFPAR parameter is unequal to the Process Segment ID on the preceding SGMT parameter.	Parameter is ignored and processing con- tinues.
PRGN9	B100I2	(Card Image)	INFPAR parameter is out of order by either Sequence ID (cols. 3-4) or relative address (cols. 13-18).	This parameter and the remainder of INFPAR parameters for segment being described are ignored and processing continues.
PRGN9	B100IE	ILLOG ERR	An illogical error has occurred.	None. Process is terminated.

6. Typeouts - Normal and Error (Cont'd)

C	MESSAGE			MEANING	ACTION
	PREFIX	CODE	VARIABLE DATA		
	PRGN9	B100L1	(Card Image)	Process Segment ID (cols. 1-2) on the LABPAR parameter is unequal to the ID of the segment being described.	Parameter is assumed to be related to the segment being described and processing continues.
	PRGN9	B100L4	(Card Image)	"Beginning-file label" indicator (col. 20) on the LABPAR parameter is other than S, C, N, or O.	0 is assumed and processing continues.
	PRGN9	B100L8	(Card Image)	"Ending-file label" indicator (col. 21) on the LABPAR parameter is other than S, C, N, or O.	0 is assumed and processing continues.
	PRGN9	B100LA	PPPPP_SS_QQ	Data on the LABPAR parameter cannot be processed because the sequence specified (cols. 3-4) is other than a label region or file region. PPPPP=Process ID SS=Segment ID. QQ=Sequence ID.	Parameter is ignored and processing continues.
	PRGN9	B100M1	OIP_MLT_NOT_ASSIGNED	The merge function is specified but NONE was assigned as the OIP MLT.	None. The process is terminated. Reinitiate the process and assign the OIP MLT.
	PRGN9	B100M4	OIP_MLT_IS_NOT_AN_MLT	No process, segment, or task appears on the tape assigned as the OIP MLT.	} Type in: 0 to terminate the process. 1 to continue after mounting the correct tape.
C	PRGN9	B100M5	GEN_MLT_IS_NOT_AN_MLT	No process, segment, or task appears on the tape assigned as the GEN MLT.	

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PRGN9	B100NE	(Card Image)	A numeric-only field in the parameter contains a nonnumeric character. The non-numeric character is typed out as a number sign (#) and the remainder of the field is verified.	All nonnumeric characters within the field are replaced by zeroes and processing continues. Only one typeout occurs per field regardless of the number of characters in error. The user should check the remainder of the field.
PRGN9	B100NG	(Card Image)	First parameter read was ENDP, but neither merge (col. 13) nor generation of an MLST (col. 14) was specified.	Type in: 1 to continue after inserting correct parameter.
PRGN9	B100NS	PPPPP	No SGMT parameter was entered for the process. PPPPP=Process ID	Segment description is truncated.
PRGN9	B100S1	(Card Image)	"Process ID" entry (cols. 1-5) on the STARTP parameter is less than the Process ID on the preceding STARTP parameter.	Processes are generated and written to the output in the order in which the parameters are entered.
PRGN9	B100SB	(Card Image)	Basic sort/merge process identified in cols. 1-5 on the S/MSYS parameter is not on the OIP MLT.	All parameters for the process are ignored and processing continues.
PRGN9	B100SD	PPPPP_SS	When multiple segment description blocks from the input PLT are combined into a single block to be written to the GEN MLT, the maximum allowable block size of 3200 characters is exceeded. PPPPP=Process ID SS=Segment ID	The maximum size segment description block (3200 characters) is written to the GEN MLT and processing continues.

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PRGN9	B100T1	(Card Image)	"Typeout code" entry (col. 14) on STARTP parameter is other than S or space.	Space is assumed and processing continues.

SORT/MERGE SYSTEM (RSSMS)

1. Function

The prime function of the 3301 Tape Sort/Merge System is to order records, contained within files conforming to 3301 Data File Standards, in a prescribed fashion.

2. Specifications

(See RCA 3301 Tape Sort/Merge Manual, 94-30-001)

3. Device Assignment

a. Device Information

First 4 Characters of DEVPAR Parameter	Category	
	Sort	Merge
IT01	Input(s)	Input #1
IT02	Not Used	Input #2
IT03	Not Used	Input #3
IT04	Not Used	Input #4
IT05	Not Used	Input #5
IT06	Not Used	Input #6
IT07	Not Used	Input #7
IT08	Not Used	Input #8
IT09	Not Used	Input #9
IT10	Not Used	Input #10
WKT1	Work Tape Set 1	Not Used
WKT2	Work Tape Set 2	Not Used
WKT3	Work Tape Set 3	Not Used
WKT4	Work Tape Set 4	Not Used
WKT5	Work Tape Set 5	Not Used
CYC1	Cycle Output Set 1	Not Used
CYC2	Cycle Output Set 2	Not Used
CYC3	Cycle Output Set 3	Not Used
CYC4	Cycle Output Set 4	Not Used
CYC5	Cycle Output Set 5	Not Used
FINO	Final Output	Final Output

When long sorts are to be run, full reels of tape are needed for work tapes and cycle outputs.

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b. Label Information

First 4 Characters of LABPAR Parameter	Category	
	Sort	Merge
IF01	Input File #1	Input File #1
IF02	Input File #2	Input File #2
IF03	Input File #3	Input File #3
IF04	Input File #4	Input File #4
IF05	Input File #5	Input File #5
IF06	Input File #6	Input File #6
IF07	Input File #7	Input File #7
IF08	Input File #8	Input File #8
IF09	Input File #9	Input File #9
IF10	Input File #10	Input File #10
PCYC	Cycle Output Purge Date	Not Used
FINF	Final Output File	Final Output File

4. Process I.D.

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RSSMS

5. Parameters (INFPAR)

Parameters required by the 3301 Tape Sort/Merge System fall into four categories, and are supplied by way of INFPAR messages. The categories are listed below. (See the Sort/Merge Manual for detailed information.)

<u>Seq. I.D.</u>	<u>No. Chars.</u>	<u>Category</u>
IC	22	Input Control Information
KC	50	Key Control Information
OC	22	Output Control Information
RC	50	Run Control Information

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
RSSMS	S11001	PARAMS START AT xxxxxx	xxxxxx=MSC of RC50, IC22, OC22 and KC50 parameter information.	None.
0	S11002	00	Input procedures have not been specified and no input tape has been defined.	Recovery impossible. Condition must be corrected and re- generation per- formed if necessary.

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6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION	
PREFIX	CODE	VARIABLE DATA			
RSSMS	S11003	TXXX WAS RE-RUN RECEIVER	Input tape xx has been defined as a rerun receiver.	None. Parameter is ignored.	©
RSSMS	S11004	IT01 ALTERNATE DEALLOCATED	Alternate input tape is equal to primary input tape.	Alternate input will be deallocated.	©
RSSMS	S11005	WKT WAS RECEIVER, CONTROLLER OR MULTI-FILE	Sort work tape has been defined incorrectly.	None. Parameter is ignored.	©
☐ 0	S11007	00	Sort input tape has been defined as a sort work tape and primings are not equal.	Recovery impossible. Condition must be corrected and regeneration performed if necessary.	
☐ 0	S11008	00	The same tape unit has been assigned to more than one sort work tape.		
☐ 0	S11009	00	More than one input tape has been duplicated as a sort work tape.		
☐ 0	S11010	00	A sort has been specified and three or more sort work tapes have not been assigned.		
☐ 0	S11011	00	No final output tape nor output procedures have been specified.		
☐ 0	S11012	00	Sort input tape has been defined as both a Sort work tape and		
☐ 0	S11013	00	as the final output tape.		

6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
☐ 0 ☐ 0	S11014 S11015	00 00	A cycle output tape is equal to sort input tape.	Recovery impossible. Condition must be corrected and re-generation performed if necessary.
☐ 0	S11016	00	A cycle output tape is equal to a final output tape.	
© RSSMS	S11017	CYCO WAS RECEIVER OR MULTI-FILE	Cycle output tape has been defined incorrectly.	None. Condition ignored.
© RSSMS	S11018	FINO ALTERNATE DEALLOCATED	Alternate output tape is equal to primary output tape or a tape which will be used to mount a cycle output for a multicycle merge.	Alternate final output will be de-allocated.
© RSSMS	S11019	MAXIMUM NUMBER OF CYCLES IS-X	The number of cycle outputs that may be created is less than the way of the merge and is indicated by the value (X).	None.
☐ 0	S11020	00	A file merge has been specified and no input tape has been allocated.	Recovery impossible. Condition must be corrected and re-generation performed if necessary.
© RSSMS	S11021	ITXX WAS RECEIVER	The indicated (XX) file merge input tape has been defined as a rerun receiver.	None. Parameter ignored.
☐ 0	S11022	00	The same tape unit has been assigned to more than one merge input tape.	Recovery impossible. Condition must be corrected and re-generation performed if necessary.

6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
0	S11024	00	A file merge has been specified and the final output tape has been assigned as an input tape.	Recovery impossible. Condition must be corrected and regeneration performed if necessary.
RSSMS	S11025	FINO WAS RECEIVER OR MULTI-FILE	Final output of a sort has been defined as a rerun receiver or multi-file reel.	None. Parameter is ignored.
RSSMS	S11027	ITYY xxxxxx OPTIONAL FILE	Sort file xxxxxxxx has been defined as an optional file.	Type "Y" to accept file; "N" to reject file.
RSSMS	S11028	xxxx NOT MAGNETIC TAPE	The device designated by xxxx is not a magnetic tape.	Recovery impossible. Condition must be corrected and regeneration performed if necessary.
0	S11029	00	1. IFXX LABPAR present and Field 2 (RC50 INFPAR) not spaces, or 2. IR01 LABPAR present and Field 2 (RC50 INFPAR) is spaces, or 3. IFXX and IR01 LABPAR both present.	For file mode, reel counter must be spaces. IR01 is <u>reel</u> mode; reel counter must have an entry. Reinitiate the process with appropriate corrections.
0	S11202	00	Both Own Code types I and F incorporated.	Recovery impossible. Condition must be corrected and regeneration performed if necessary.
0	S11203	00	Both Own Code types O and L incorporated.	
0	S11204	00	Field 1 (RC50 INFPAR) not P or M.	
0	S11205	00	File merge specified with Own Code I and/or F incorporated.	
0	S11206	00	Field 2 (RC50 INFPAR) reel indicator not numeric or space.	
0	S11207	00	Own Code not present, memory allocated via field 4 (RC50 INFPAR).	
0	S11208	00	Own Code present, memory not allocated via field 4 (RC50 INFPAR).	

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6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
0	S11209	00	Own Code not present, memory allocated via field 5 (RC50 INFPAR).	Recovery impossible. Condition must be corrected and regeneration performed if necessary.
0	S11210	00	Own Code present, memory not allocated via field 5 (RC50 INFPAR).	
0	S11211	00	Own Code present, memory not allocated via field 6 (RC50 INFPAR).	
0	S11212	00	Own Code not present, memory allocated via field 6 (RC50 INFPAR).	
0	S11213	00	Field 8, 501 EF/ED indicator (RC50 INFPAR) not H, 8 or space.	
0	S11214	00	Field 9, 501 input short batch indicator (RC50 INFPAR) not 1 or space.	
0	S11215	00	Field 10, 501 output short batch indicator (RC50 INFPAR) not 1 or space.	
0	S11216	00	Field 12, open indicator not N or space (RC50 INFPAR).	
0	S11217	00	Field 13, positioning counter not numeric or spaces (RC50 INFPAR).	
0	S11218	00	Field 7, multicycle indicator not Z or space (RC50 INFPAR).	
0	S11219	00	Sequence check (Field 11) not S or space (RC50 INFPAR).	
0	S11220	00	Field 1, record type not B, C, or D (IC22 INFPAR).	

6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
0	S11221	00	Field 2, record symbol entry missing (IC22 INFPAR).	Recovery impossible condition must be corrected and regeneration performed if necessary.
0	S11222	00	Field 3, maximum record length not decade oriented, record type B or C specified (IC22 INFPAR)	
0	S11223	00	A file merge has been specified and: 1. Field 5, maximum No. of records per batch and field 6, maximum batch length both contain spaces. 2. Field 5, maximum No. of records per batch contains spaces and record type B has been specified.	
0	S11224	00	Field 5, maximum No. of records per batch contains alphas or all zeros (IC22 INFPAR).	
0	S11225	00	1. Field 6, maximum batch length is less than 0013 or contains alphas. 2. Field 3, maximum record length is greater than field 6, maximum batch length. (IC22 INFPAR).	
0	S11226	00	Field 7, normal record length is less than 0013, contains alphas, or is missing (IC22 INFPAR).	
0	S11227	00	Interrupt tally (Field 12) not spaces or numeric (RC50 INFPAR).	

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6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
0	S11228	00	Field 8, rewind option, not N, L, or space (IC22 INFPAR).	Recovery impossible. Condition must be corrected and regeneration performed if necessary.
0	S11230	00	Field 1, record type is not the same as input record type and Own Code L has not been incorporated (OC22 INFPAR).	
0	S11231	00	Field 2, record symbol entry missing (OC22 INFPAR).	
0	S11232	00	Field 3, maximum record length is less than 0013 or greater than 4500 (OC22 INFPAR).	
0	S11233	00	Field 5, maximum No. records per batch contains alphas or all zeros (OC22 INFPAR).	
0	S11234	00	1. Field 5, maximum No. records per batch and field 6, maximum batch length both contain entries. 2. Field 6, maximum batch length is less than 0013 or contains alphas (OC22 INFPAR).	
0	S11235	00	Reserved.	
0	S11236	00	Field 8, rewind option not N, L, or space (OC22 INFPAR).	Correct Field 3 or 5 entry of OC22 INFPAR and re-initiate the process.
0	S11237	00	Requested output batch size exceeds 99999 characters.	

6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
0	S11240	00	Field 1, No. of keys contains illegal entry (KC50 INFPAR).	Recovery impossible. Condition must be corrected and regeneration performed if necessary.
0	S11241	xx	Field (xx), key position contains illegal entry (KC50 INFPAR).	
0	S11242	xx	Field (xx), key size contains illegal entry (KC50 INFPAR).	
0	S11243	xx	Field (xx), key direction contains illegal entry (KC50 INFPAR).	
0	S11244	00	Overlapping key (KC50 INFPAR).	
0	S11245	xx	Field (xx), (KC50 INFPAR) Key position greater than normal record size (Field 7, IC22 INFPAR).	
0	S11250	00	Illogical halt. Segment exit not found when the sort is attempting to load Phase 2 segments.	Perform console routines 07, 09 and 17B. Submit results to RCA.
0	S11251	00	Field 1 (RC50 INFPAR) not P or M.	Adjust parameter entry and reinitiate.
0	S12101	00	Working storage too small.	Decrease input batch size (or increase memory available to sort/merge or decrease No. of work tapes) and reinitiate.

6. Typeouts - Normal and Error (Continued)

	MESSAGE			MEANING	ACTION
	PREFIX	CODE	VARIABLE DATA		
	0	S12104	00	Insufficient memory for Phase 3.	Reduce "way" of sort or merge and reinitiate. If way is at minimum, the files may not be sorted or merged with the amount of memory available.
	0	S12105	00	Insufficient memory for Phase 4. Maximum output record length in OC22 INFPAR is greater than the calculated maximum output batch size for Phase 4.	
A	RSSMS	S12106	MERGE OUTPUT BATCH SIZE IS XXXXXX.	XXXXXX=Maximum final output batch size.	None. (This typeout will not occur if own code 0 has been incorporated).
	0	S12106	00	The final output batch size requested by the user cannot be provided due to insufficient memory. The reduced batch size is shown by the preceding typeout.	User may continue or terminate the process. The desired output batch size may be provided by increasing the amount of memory available to the sort/merge, decreasing the input batch size, or decreasing the number of work tapes, and re-initiating the process.
A	0	S15001	00	Illogical halt. Error in segment loading.	Perform console routines 07, 09 and 17B of all memory. Submit results to RCA.
C	RSSMS	S19901	LABEL TAPE ON TRUNK YY AS CYCLE OUTPUT NN	A cycle output has been produced.	Label tape as indicated.
	0	S 19901	00		
C	RSSMS	S19902	DISMOUNT CYCLE OUTPUT ON TRUNK YY	Save cycle output tape from trunk YY.	Dismount, label and save indicated tape.
	0	S19902	00		

6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
RSSMS	S19903	MULTI-CYCLE INPUT RECORD COUNT xxxxxxx OUTPUT RECORD COUNT xxxxxxx	xxxxxxx=total input and output record counts for all cycles when the last cycle has been completed.	None.
RSSMS	S19904	MOUNT CYCLE OUT- PUTS AS FOLLOWS: 01-XX, 02-XX	Multicycle condition exists, and either end of input reached, or multi- cycle volume limit exceeded.	Mount cycle outputs as indicated.. where: XX = trunk
RSSMS	S19905	REPOSITIONING COUNTER IS xxxxxxx	Multicycle volume limit has been ex- ceeded.	If sorting is to be continued, the current in- put tape must be repositioned the indicated No. of blocks.
RSSMS	S19906	TYPE 02 FOR MERGE, 03 TO TERM OR 04 FOR MERGE AND PARAM PRINT	The last cycle of a multicycle sort has just been executed.	To merge cycle outputs type 02, to termin- ate process type 03. To merge cycle outputs and typeout reentry parameters type 04.
RSSMS	S19907	RE-ENTRY PARA- METERS ARE AS FOLLOWS;	The last cycle of a multicycle sort has just been executed and the user has not elected to merge cycle outputs at this time. The parameters nec- essary for a file merge are typed as shown.	None.
RSSMS	S19907	01 RC50 INFPAR...		
RSSMS	S19907	01 IC22 INFPAR...		
RSSMS	S19907	01 OC22 INFPAR...		
RSSMS	S19907	01 KC50 INFPAR...		

6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
RSSMS	S19908	MOUNT WORK ON TRUNK xx	Work tape requirement.	Mount work tape on indicated trunk. Type 02 (Process ID) to continue.
□ 0	S19908	00		
RSSMS	S19909	CYCLE INPUT RECORD COUNT xxxxxxx OUTPUT RECORD COUNT xxxxxxx	xxxxxxx = the input and output record counts for the cycle which has just been completed.	None.
□ 0	S27301	00	User Own Code F (SGEXIT 64 parameter) load address is to the left of own codes C, E, N, or T.	Correct and regenerate process.
RSSMS	S27302	REMOUNT INPUT ON TRUNK xx	Multicycle condition exists and input has been dismounted and replaced by work tape. Process now ready to read more input on indicated trunk xx.	Remount input reel on trunk xx, type 02 (Process ID) to continue.
□ 0	S27302	00		
□ 0	S27303	XX	Multicycle condition exists, alternate input trunk xx now available to mount any remaining input reel.	If more input remains to be processed, mount next reel on trunk xx. When mounted, or if no more input, type 02 (process ID) to continue.
RSSMS	S27304	CONTINUE WHEN WORK MOUNTED ON TRUNK XX.	Work Tape Requirement.	Mount work tape on indicated trunk XX. Type 02 (process ID) to continue.
□ 0	S27304	00		

6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
▣ 0	S27305	XX	A trunk of different device type has been substituted for an original trunk during RESTART. XX= invalid trunk.	Reinitiate RE-START with trunk changes of same device type and priming.
▣ 0	S27306	XX	A trunk with a different priming code has been substituted for an original trunk during RESTART. XX= invalid trunk.	

6. Timeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
0	S27307	XX	One of the following nonrecoverable abnormal terminations has occurred during a READ from trunk XX: 1. Magnetic tape alarm. 2. A-B equality, and no gap sensed. 3. Device not following. 4. Busy or inoperable interrupt received at READ initiation.	No recovery is possible. Device region address is contained in Modifier 1. Check Field 3 of IC22 INFPAR entry.
0	S27308	XX	Input exhausted on Trunk XX.	Replenish input on alternate trunk XX. Type 02 (Proc. ID) to continue.
0	S27309	XX	Input exhausted on Trunk XX.	Replenish input on same trunk XX. Type 02_(Process ID) to continue.
0	S27310	XX	One of the following nonrecoverable abnormal terminations has occurred following a WRITE from Trunk XX: 1. Device inoperable. 2. Tape at BTC. 3. Splice detected.	No recovery is possible. Device region address is contained in Modifier 1.

6. Typeouts - Normal and Error (Continued)

PREFIX	MESSAGE		MEANING	ACTION
	CODE	VARIABLE DATA		
0	S27311	XX	ETW has been sensed on trunk XX.	Short work tape. Mount a full reel on trunk XX and reinitiate the process.
0	S27312	XX	A short record has been found in the input data during Phase 2.	No recovery is possible. Suggested causes: 1. Incorrect entry in field 3 of IC22 INFPAR. 2. Error in input data. 3. Input device malfunction during read of input.
0	S27501	00	An illogical condition has occurred in First Pass tree initialization (fixed).	No recovery is possible. Perform console routines 07, 09, and 17B of all memory. Submit results to RCA.
0	S27502	00	An illegal code has been received from FPOC.	No recovery is possible. Condition must be corrected and regeneration performed if necessary.
0	S27701	00	An illogical condition has occurred in First Pass tree initialization (variable).	No recovery is possible. Perform console routines 07, 09, and 17B of all memory. Submit results to RCA.
0	S27703	00	An input record of less than 13 chars. has been detected during 1st pass ("D" type)	Recovery impossible input must be corrected

6. Typeouts - Normal and Error (Continued)

MESSAGE				
PREFIX	CODE	VARIABLE DATE	MEANING	ACTION
☐ 0	S27702	00	An illegal code has been received from FPOC.	No recovery is possible. Condition must be corrected and regeneration performed if necessary.
RSSMS	S37801	CONTINUE WHEN WORK MOUNTED ON TRUNK XX.	Work tape requirement.	Mount work tape on indicated trunk XX. Type 02 (process ID) to continue. ©
☐ 0	S37801	00		
☐ 0	S37901	XX	One of the following nonrecoverable abnormal terminations has occurred during a READ from trunk XX: 1. Magnetic tape alarm. 2. A-B equality and no gap sensed. 3. Device not following. 4. Busy or inoperable interrupt received at READ initiation.	No recovery is possible. Device region-address is contained in Modifier 1.
☐ 0	S37902	XX	A batch of invalid size has been read from trunk XX.	No recovery is possible.
☐ 0	S37904	XX	A selected record has been found to be out of sequence with the last outputted record during a Merge. The record was read from trunk XX.	Perform console routines 07, 09, 17B of all memory. Dump trunk XX <u>without</u> rewind. Submit results to RCA.

6. Typeouts - Normal and Error (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
0	S38701	XX	One of the following non recoverable abnormal terminations has occurred following a WRITE to trunk XX: 1. Device inoperable. 2. Tape at BTC. 3. Splice detected.	No recovery is possible. Device region address is contained in Modifier 1.
0	S38702	XX	ETW has been sensed on trunk XX.	Mount a full reel on trunk XX and reinitiate the process.
0	S399_ _	00	ILLOGICAL CONDITION	None. Perform console routines 07, 09 and take a panic dump of all memory. Submit results to RCA.
RSSMS	S49701	INPUT RECORD COUNT xxxxxxxx	xxxxxxx = volume of data inputted to a single cycle sort.	None.
RSSMS	S49702	OUTPUT RECORD COUNT xxxxxxxx	xxxxxxx = final output record count.	None. (This type-out will not occur if own code type 0 has been incorporated.)
RSSMS	S49704	MOUNT WORK ON TRUNK xxyy	Work tape requirements.	Mount work tapes on indicated trunks. Type 02 (Process ID) to continue.
0	S49704	00		
RSSMS	S56201	ERR xxxxxxx xxxxxx	Read error. Parity on data has occurred xxxxxx = limits of batch in error, XX = trunk.	Type 02 (Process ID) to delete batch and continue.
0	S56201	XX		

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TAPE COMPARE (TCOMP)

1. Function

This routine compares the contents of the blocks of one magnetic tape with the contents of the blocks of another magnetic tape and indicates the differences between the two tapes.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

- a. This routine compares two tapes, reading in either a forward or reverse direction, until a specified number of blocks, E/F's, or E/D's have been processed, or until an inequality is detected. One may also position forward until the first 10 characters of a block are equal to a specified value or until an E/D is reached (whichever occurs first). Comparison begins with the block equal to the specified value or block following the E/D.
- b. The maximum record size is 4510 characters.
- c. Positioning of either or both tapes in a forward or reverse direction is possible at routine initiation time, after an inequality has been detected, or upon termination of the comparison specified. The positioning may be a specified number of blocks, E/F's, or E/D's or the tape may be rewound. The positioning parameter permits the same tape to receive more than one positioning command, i.e. Rewind to BTC, forward one E/F, forward five blocks. One parameter may be used to position both tapes.
- d. When two blocks are found to be unequal, they are written to a display device.
- e. The routine continues comparing subsequent tape blocks after an unequal block has been detected and displayed, unless the user specifies that a halt is to occur at that time. In the latter case the user may then terminate the routine or optionally position either or both tapes and continue processing.
- f. At routine termination time, a Console Typewriter message indicates both the total number of blocks compared, and the total number of unequal blocks.

3. Device Assignments

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01	_IP_TP_1	01	05
02	_IP_TP_2	01	06
50	_OP_PRNT	01	07
40	_OIP_PRAM	01	04

4. Process ID - TCOMP

5. Parameters - INSERT PARAMETER

Parameters are:

a. COMP $\left\{ \begin{matrix} F \\ R \end{matrix} \right\} \left\{ \begin{matrix} BL \\ EF \\ ED \end{matrix} \right\} \quad nnnn \quad \left[_ssss \right] \left[_H \right]$

COMP = compare parameter (mandatory)

F = compare forward

R = compare reverse

BLnnnn = variable number of blocks

EFnnnn = variable number of E/F's

EDnnnn = variable number of E/D's

To be read from
logical tape 01.

ssss = maximum size of blocks (variable)

H = halt on inequality

b. ~~END~~ ^{STOP} = terminates process and rewinds input tapes.

c. $\left[\begin{matrix} POSIy \\ \left\{ \begin{matrix} FBL \\ FEF \\ FED \\ RBL \\ REF \\ RED \\ BTC \end{matrix} \right\} \\ nnnn \end{matrix} \right] \left[\begin{matrix} \left\{ \begin{matrix} FBL \\ FEF \\ FED \\ RBL \\ REF \\ RED \end{matrix} \right\} \\ nnnn \end{matrix} \right] \left[\begin{matrix} \left\{ \begin{matrix} FBL \\ FEF \\ FED \\ RBL \\ REF \\ RED \end{matrix} \right\} \\ nnnn \end{matrix} \right] \left[\begin{matrix} ; POSIz \dots \end{matrix} \right]$

POSI = positioning parameter

y = 1 for logical tape 01

z = 2 for logical tape 02

FBL = read forward blocks

FEF = read forward E/F's

FED = read forward E/D's

RBL = read reverse blocks

REF = read reverse E/F's

RED = read reverse E/D's

nnnn (variable - 1 to 4
characters) specifies the
number of blocks or
sentinels.

BTC = rewind the tape

, = separates positioning parameters for the same tape.

; = indicates positioning for next tape.

d. POSIyEQUVVVVVVVVV

POSI = position

y = 1 for logical tape 01

= 2 for logical tape 02

EQU = equality constant

VVVVVVVVVV = first 10 characters of the block desired

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
TCOMP	B40701	INSERT_PARAMETER	User has specified the Console Typewriter as the input device.	Enter parameter. See 5.
TCOMP	B40702		Unequal blocks have been detected with the Halt option used.	Type in: 0 to terminate process without rewinding tapes. 2 to continue. 3 to remove Halt option and type in new parameter.
TCOMP	B40703	X...X	Invalid N...N has been specified in position or compare parameter X...X or invalid block size in Compare parameter.	Type in correct parameter.
TCOMP	B40704	X...X	Invalid parameter, X...X in character positions 1 through 4.	Type in correct parameter.
TCOMP	B40705	X...X	Invalid positioning parameter, X...X in character positions 5, 6 and/or 7.	Type in correct parameter. If multiple positioning has been specified, partial positioning (up to erroneous part of message) has occurred.
TCOMP	B40706	X...X	Missing comma (,) or semi-colon (;) in POSI parameter.	Type in correct parameter. If multiple positioning has been specified, partial positioning (up to erroneous part of message) has occurred.
TCOMP	B40707	X...X	Invalid compare parameter, X...X, in character positions 5, 6, and/or 7.	Type in correct parameter.

(Continued)

6. Timeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
TCOMP	B40708		An E/D has been reached before the equal block is found.	Type in: 0 to terminate without re-winding tapes. 1 to enter new parameter.
TCOMP	B40709	X...X	Invalid compare parameter, X...X, N...N omitted.	Type in correct parameter.
TCOMP	B40710	TAPE OX POS: TAPE OX POS	The tapes have been positioned as specified in the POSI parameter.	None.
TCOMP	B40711	00000 COMP, 000 UNEQ	The tapes have been compared as specified in compare parameter.	None.
TCOMP	B40712		An E/D has been detected on tape 2 unequal to tape 1.	None. Process terminates.
TCOMP	B40766	OX	Tape X contains a record larger than 4,510 characters.	Process restarts.
TCOMP	B40777		An abnormal termination has occurred on device specified by previous Device Control timeout.	Process restarts.
TCOMP	B40788	INV_REPLY	The reply to the previous timeout was invalid.	Type in correct reply.
TCOMP	B40799	END_OF_RUN	Process has terminated.	None.

(This page deleted by revision, 10/65)

TAPE PRINT (TPPRT)

1. Function

This routine prints unbatched data from Model 581 or 582 tape.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

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- a. Data blocks to be printed may be up to 15,000 characters in length.
- b. Selective or multiple-file printing is permitted.
- c. Label check is not provided; however, labels present for specified files will be printed.

3. Device Assignments

Logical Device No.	File Name	Seg No.	Seq. No.
01	_IP_TAPE	01	03
50	_OP_PRNT	01	04

4. Process ID - TPPRT

5. Parameters:

- a. TO POSITION TAPE AT FILE(S) TO BE PRINTED INSERT TWO DIGIT NUMBER OF EF'S TO UNWIND. INSERT 00 IF NO TAPE POSITIONING REQUIRED. CONTINUE.
- b. INSERT TWO DIGIT NUMBER OF EF'S TO PRINT. INSERT 99 TO PRINT TO AN ED. CONTINUE.

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
TPPRT	B30302		A low-paper alarm has occurred from the printer.	Replenish paper and type a 2 to continue.
TPPRT	B30303		Requesting number of E/F's to print.	Insert two-digit number of E/F's to print. Insert 99 to print to an E/D.
TPPRT	B30304		Error in priming code.	None.
TPPRT	B30305		Requesting device number under special option.	Type two-digit device number.

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6. Typeouts - Normal and Error (Cont'd)

MESSAGE				
PREFIX	CODE	VARIABLE DATA		
TPPRT	B30306		Requesting priming code under special option.	Type in one-digit priming code.
TPPRT	B30307		Requesting number of E/F's to unwind.	Type in two-digit number of E/F's to unwind. Type 00 if no positioning desired.
TPPRT	B30308		An E/D has been found before inserted number of E/F's unwound.	Type in 0 to terminate; otherwise rewind the tape and type 1 to read a new parameter.
TPPRT	B30377		An abnormal termination has occurred from the device specified by previous Device Control typeout.	None. Process terminates.
TPPRT	B30388	INV_REPLY	Reply to previous typeout was invalid.	Type in correct reply.
TPPRT	B30399	END_OF_RUN	Process has terminated.	None.

Warning message displayed on printer:

"THIS_BLOCK_NOT_PRINTED_BECAUSE_IT_IS_OVER_15,000_CHARS_LONG."

UNBATCHED CARD TO TAPE/PRINTER (CRDTP)

1. Function

This routine transcribes 80-character records from punched cards to magnetic tape or to the on-line printer.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

- a. E/F's to be transcribed must be single-character punches in column 1 with columns 2 through 80 blank; otherwise, they will be treated as 80-character records.
- b. To terminate the process, the last card must have "END" punched in columns 1 through 3 with columns 4 through 80 blank; otherwise, it will be treated as an 80-character record. This "END" card will not be transcribed but will generate a one (1) character E/D to be transcribed.
- c. To transcribe labels, the user must supply the E/F's wherever they must appear; however, the label itself will be transcribed as an 80-character label. (A card count will not be maintained.)
- d. When the binary mode is specified, 160 characters will be read and written. A single character E/F is represented by 5, 6, 7, and 9 punches in column 1 with columns 2 through 80 blank. The last card (END) will have 12, 0, 3, 4, 6, 8, punches in column 1, and 6 and 8 punches in column 2. The binary option assumes 324 or 329 Card Reader with no editing of data.

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
40	_IP_CARD	01	01
01	_OP_TAPE	01	02

4. Process ID - CRDTP

5. Parameters

a. CRDTP INSERT PARAMETERS

Ø = Translate mode
1 = Binary mode

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
CRDTP	B30101	INSERT_PARAMETER	Insert Binary/Translate information.	See Parameter 5.a.
CRDTP	B30102		A low-paper alarm has been received from the printer.	Replenish paper, type in 2 to continue.
CRDTP	B30103		ETW on output tape	Mount new reel, type 2 to continue.
CRDTP	B30104		Bad Parameter.	Type in correct parameter.
CRDTP	B30177		Abnormal termination on device specified in previous device control error type-out.	None. Process terminates.
CRDTP	B30188	INV_REPLY	Reply to previous error typeouts was invalid.	Type in correct reply.
CRDTP	B30199	END_OF_RUN	End of Process	Process terminates.

VARIABLE LENGTH RECORD CARD TO TAPE (CTTV1)

1. Function

The routine transcribes variable-length records from punched cards to magnetic tape.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

- a. A record may be contained in one or more cards and cannot exceed 4500 characters. A record may also be less than 80 characters; however, one card may not contain more than one record.
- b. The right-hand end of a record is determined by a specified user control symbol followed by a space. Therefore, this symbol may be a character in the record so long as it is not followed by a space. This symbol and space following will not be part of the record written to magnetic tape.
- c. E/F's to be written to tape must be single-character punches in column 1 with columns 2 through 80 blank.
- d. To transcribe labels to tape, the user must supply the E/F's wherever they must appear; the labels themselves must be followed by the specified symbol followed by a space. A card count will not be maintained.
- e. To terminate the process, the last card must have "END" punched in columns 1 through 3 with columns 4 through 80 blank; a one (1) character "E/D" will be written to tape.
- f. A user may use this routine to simulate transcribing any type of batching and/or record type formats; however, the user is responsible for these formats being punched in the cards themselves.
- g. When binary mode is specified, 160 characters will be read; the E/F should be represented by 5, 6, 7, and 9 punches in column 1 with column 2 through 80 blank. The termination characters (END) should be represented by 12, 0, 3, 4, 6, and 8 punches in column 1, and 6 and 8 punches in column 2 with columns 3 through 80 blank.

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
40	_IP_CARD	01	01
01	_OP_TAPE	01	02

4. Process ID - CTTV1

5. Parameters

a. INSERT PARAMETER

AB

A = Card mode; 0 = translate, or 1 = binary
B = user specified control symbol

6. Typeouts - Error and Normal

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
CTTV1	B30501	INSERT_PARAMETER	Enter parameter	See 5.a
CTTV1	B30503		ETW on output	Mount another reel and type a 2 to continue.
CTTV1	B30504		Parameter typed incorrectly.	Type correct parameter.
CTTV1	B30505		Input record exceeds 4500 characters.	None. Process terminates.
CTTV1	B30506		Record is less than 3 characters but is not an EF or ED.	None. Informative warning. Message is written and process continues.
CTTV1	B30577	INV_REPLY	Abnormal termination on device specified by previous device control message.	None. Process terminates.
CTTV1	B30588		Reply to previous error typeout was invalid.	Type correct reply.
CTTV1	B30599	END_OF_RUN	End of Process	None. Process terminates.

RENAME (RENAM)

1. Function

This routine will extract a generated process from an MLT; it is also capable of changing the name of the process.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

The input is the MLT containing the process(es) that is to be extracted and/or renamed; the output is an MLT containing only those processes requested.

3. Device Assignments

Logical Device No.	File Name	Seg. No.	Seq. No.
01	_IP_TAPE	01	01
40	OIP_PRAM	01	03
02	_OP_TAPE	01	02

4. Process ID - RENAM

5. Parameters: may be entered by Console Typewriter or cards.

a. RENAME -

positions 1 - 5 6 7 - 12 13 14 - 18 19 →

Current		New
Process ID	sp RENAME sp	Process ID Blank

b. STOP

positions 1-4 5 →

STOP Blank

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
RENAM	B40501	INSERT_PARAMETER	Parameters are to come from the Console Typewriter.	Type in parameter. See paragraph 5.
RENAM	B40504	X...X	Parameter X...X has been typed incorrectly.	Type in correct parameter.
RENAM	B40505	X...X	A sequence error has been detected on output MLT. Processes are not in ascending order.	Type in: 0 to terminate the process. 1 to type in correct parameter.

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
RENAM	B40506	X...X	Process specified in parameter not on input MLT or is out of sequence.	Type in: 0 to terminate the process. 1 to type in correct parameter. 2 to rewind the input tape and search the input MLT for the process.
RENAM	B40507		Input tape not in standard MLT format.	Type in: 0 to terminate the process. 1 to mount new reel and read new parameter.
RENAM	B40577		An abnormal termination has occurred from the device specified by previous Device Control typeout.	None. Process terminates.
RENAM	B40588	INV_REPLY	Reply to previous typeout is invalid.	Type in correct reply.
RENAM	B40599	END_OF_RUN	Process has terminated.	None.

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CALL LIBRARY GENERATOR (CLGEN)

1. Function

The CALL Library Generator performs file maintenance on the CALL Library for the Assembly System. It is capable of creating a new library from cards; adding new routines to an existing library; replacing routines on an existing library; or deleting routines from an existing library. Routines on the CALL Library Tape may then be extracted by using the CALL function of the 3301 Assembly System at assembly time.

Any portion of a program written for the 3301 Assembly System may be converted for generation onto the CALL Library Tape.

2. Specifications

- a. Normal input is from cards. These cards may represent any or all components of a program with the following exceptions:

No START or STARTC.
No END or ENDC.
No CALL.
No NAME.
No SGMT.
No SEQ.
No SEQX.
No DELETE

The first DEFSEQ of a program may not be "called" from the CALL Library.

- b. When a new CALL Library is being created, the format is as follows:

Card 1

Columns 7-12 should contain NEWLIB.

Card 2

Columns 7-12 should contain STARTL.

Columns 13-18 should contain a six character alphanumeric, CALL Identification Number.
This Identification must not be 000000.

The CALL Library statements then follow in standard 3301 Assembly language format. The deck must be followed by a card with ENDL placed in columns 7-10.

Several such decks may be combined to be placed onto the library. These decks must be in order by CALL Identification Number. The last ENDL card must be followed by a card with an E/F in column 1.

- c. When a new CALL is to be placed onto an existing library, or when an existing CALL is being replaced, the format of the CALL is the same as specified above except that Card 1 is omitted.

- d. When an existing CALL is to be deleted from a CALL library, one card in the following format is the only requirement:

Columns 7-12 should contain STARTL.

Columns 13-18 should contain the CALL Identification number.

Columns 20-25 should contain DELETE.

CALLs may be added, replaced, or deleted in any combination so long as the following is observed:

- 1) A STARTL-DELETE must not be followed by an ENDL.
- 2) All CALLs must be in collating sequence.

3. Device Assignments

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
06	PRNT_OUT	01	03
05	CARD_IN	01	04
01	CALL_OUT	01	05
02	OCALL_IN	01	06

4. Process ID - CLGEN

5. Parameters - None

6. Error Printouts

Error records are printed on the printer with an associated error code. Printed records are not placed on the library tape. These codes and their meanings follow:

<u>ERROR CODE</u>	<u>MEANING</u>
1	First card is not valid; should be STARTL or NEWLIB.
2	CALL Identification is not alphanumeric; contains special characters.
3	STARTL is missing; ENDL not followed by a STARTL or E/F.
5	Operation Code error; is a START, END, or CALL.
6	A STARTL-DELETE is not followed by a STARTL or E/F.
7	STARTL contains a CALL Identification that is out of order (not in collating sequence).
8	ENDL is missing; STARTL not preceded by ENDL or STARTL-DELETE. ENDL is generated on the library tape at this point.
9	Last card not an ENDL.

MLT DELETE (MLTDE)

1. Function

This routine deletes one or more processes from an MLT.

2. Specifications

Ⓐ Refer to 3301 Service Routine Library (94-30-002).

Input to this routine is the MLT containing the process(es) to be deleted. This routine accepts an MLT with or without standard labels. The output MLT contains all remaining processes.

3. Device Assignments

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01	_IP_TAPE	01	02
02	_OP_TAPE	01	03
40	OIP_PRAM	01	04

4. Process ID - MLTDE

5. Parameters: May be entered by Console Typewriter or cards.

- a. Delete Message
- | | | | |
|------------|----|--------|---------|
| 1 - 5 | 6 | 7 - 12 | 13 - 80 |
| Process ID | sp | DELETE | blank |
- b. Termination Message
- | | |
|-------|--------|
| 1 - 5 | 6 - 80 |
| STOP | blank |

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MLTDE	B40201	INSERT_PARAMETER	User has specified the Console Typewriter as the parameter input device.	Type in parameter.
MLTDE	B40202		Parameter has failed sequence check.	Respond with one of the following: 0-To terminate process 1-To read another parameter

(Cont'd)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MLTDE	B40203	PPPPP_SSSSSS	A segment process name was unequal to the process name. PPPPP = process ID SSSSSS = process segment ID.	None. The segment is deleted if PPPPP is a process to be deleted; otherwise the segment is written to the output tape. Processing continues.
MLTDE	B40204	X...X	Parameter failed validity check where X...X is the illegal parameter.	Correct the parameter via Console Typewriter and depress RELEASE to continue.
MLTDE	B40205		The first block on the input tape was neither a label nor a process/task ID block.	Respond with one of the following: 0-to terminate process 1-to restart.
MLTDE	B40206		Process ID on parameter is not on the input tape.	Respond with one of the following: 0-to terminate process 1-to continue
MLTDE	B40207	XXXXX	Last parameter contained a process ID (XXXXX) not present on the input tape.	Process terminates.
MLTDE	B40208		Input tape failed sequence check.	Process terminates.
MLTDE	B40209		No E/F after BTL.	None. Informative message.
MLTDE	B40277		Abnormal I/O termination.	Process terminates.
MLTDE	B40288		Invalid reply to error message.	Type in correct reply.
MLTDE	B40299	END_OF_RUN		

3301 COBOL COMPILER (COBOL) - SINGLE COMPILATION

1. Function

The RCA COBOL Compiler converts a 3301 COBOL source program into a machine-coded process that executes under the control of the RCA 3301 Operating System.

2. Hardware Requirements

The following minimum machine configuration is required by the 3301 COBOL Compiler:

- Model 3303 PROCESSOR (60K)
- Five magnetic tape stations (includes MLT).
- Printer or a sixth magnetic tape station.

Additional memory will be utilized by the COBOL Compiler if available.

3. Specifications

a. Input

Input to the COBOL Compiler can be a COBOL Source Program, COBOL Source Program Corrections, and a COBOL Library tape.

1) Source Program (SORS):

The source program can be introduced to the Compiler on magnetic tape, cards, or paper tape. Regardless of the input media used, the source program must be prepared as a Standard Labeled file and must conform to the 3301 FCP Standard file format as defined for that particular device. This file is identified to the Compiler by inserting the eight-character File-ID in columns 31 to 38 of the information parameter message (See Parameters, INFPAR).

a) Magnetic Tape:

- (1) If the minimum number of tapes is available, an option is provided to inform the operator to dismount the source input tape and replace it with a work tape. This option is specified by inserting a 1 in column 26 of the information parameter message. If an additional tape is available, no operator intervention is required.
- (2) The source input may be located on a tape containing more than one file (multifile tape). If the source file is other than the first file on a multifile tape, a 1 must be inserted in column 29 of the information parameter message.

b) Cards:

The source input must be prepared as a Standard Labeled single file.

c) Paper Tape

- (1) The source input must be prepared as a Standard Labeled single file.
- (2) The rules governing the paper tape source input format are specified in Section V of the Realcom COBOL Programming Techniques manual.

2) Source Program Corrections (UPDT):

Corrections to the source program can be introduced to the Compiler on either magnetic tape or cards. Regardless of the input media used, corrections must be prepared as a Standard Labeled file (Label ID UPDATE_ _) and must conform to the 3301 FCP Standard file format as defined for that particular device. The presence of corrections is indicated to the Compiler by inserting a 1 in column 21 of the information parameter message.

The rules governing correction input format are specified in Section V of the Realcom COBOL Programming Techniques manual.

3) COPY LIBRARY (COPY):

The COPY and INCLUDE phase may be entered specifying a 1 in column 23 of the INFPAR card for library copies, a 2 in column 23 for source copies only, or by the recognition by Phase 1 of the existence of a COPY, INCLUDE, or an IN LIBRARY statement in the source program. If the entry is from Phase 1, COPY and INCLUDE is called and the compilation is restarted with the COPY and INCLUDE phase. (C)

NOTE

If a work tape is pre-assigned to the COPY LIBRARY file (COPY) and the COPY and INCLUDE phase is suspended to call the SEQUENCE SORT, it will be necessary to replace the COPY LIBRARY file with a work tape. Upon the return from the sort, the operator will have to re-mount the COPY LIBRARY file on the device specified in the re-mount message. It is not possible to predict which device the compiler will assign in this case but it would be noted that the device assigned by the compiler takes precedence over any user's pre-assignment.

4) OWN-CODE (OWNC):

If ENTER ASSEMBLER is used in the COBOL program, the preassembled OWN-CODE must appear in MLT format on a tape station not otherwise used during the compilation. A DEVPAR OWNC is used to assign the tape station holding the OWN-CODE.

5) SORT Verb

If the COBOL source program contains the SORT verb, then the OWNC file must be designated as present during the compilation and an ML containing the sort (SMSYS) process must be present on the device assigned to this file. (A)

ENTER ASSEMBLER is not permitted in a COBOL source program containing the SORT verb.

b. Output

Outputs from the COBOL Compiler are an updated COBOL source program and listings (on either tape or an on-line printer, or both), an object program in Master Library Format (MLT) and informational and/or error type-outs.

1) Tape List (LIST):

This tape is a multifile tape, comprised of the following three files:

- a) Updated source program file (Label ID conforms to ID indicated in Columns 31 to 38 of the information parameter message):

This file contains the updated source in 80-character, card-image format.

- b) Listings (LABEL ID - CBL_LIST):

This file contains the Compiler listings and is a printer-destined file. The contents of this file are as follows:

- Data division memory map.
- Cross reference listing (optional) - refer to column 27 of the information parameter message (See Parameters, INFPAR).
- Source program error messages.
- Object program listing.

- c) Process description (LABEL ID-PROCDESC):

This file contains the Compiler generated process description parameters and is a printer-destined file. This file is generated on (LIST) only when (PROL) is not specified.

2) Printer list (PROL):

The printer list output is the same as that produced for the tape list (LIST).

3) Object program:

The object program is produced in Master Library format (MLT). The name of the generated process is taken from columns 73-77 of the IDENTIFICATION DIVISION card. If a process name is desired, column 73 must not be a space. If column 73 is blank, the name IDENT will be assigned to the generated process.

4. Device Assignment

Source input device (SORS) is always required. If none is specified at object time a work tape will be assigned.

Four work tapes (WKTP) are always required.

Printer list (PROL) and/or tape list (LIST) is always required.

Device Assignment (Cont'd)

LOGICAL DEVICE NUMBER	FILE NAME	SEG. NO.	SEQ. NO.	REMARKS
72	Work-1	WK	TP	Work-1 is dynamically assigned during the execution of the Compiler and therefore a fixed name cannot be assigned to it.
73	Work-2	WK	TP	Same as Work-1.
74	Work-3	WK	TP	Same as Work-1.
75	Work-4	WK	TP	Same as Work-1.
63	LIST	LI	ST	This file is required if the printer option is not selected, otherwise it is optional. This file normally contains the Compiler generated listings. However, if a precompilation routine(s) is executed, it is possible that some other device may contain the listings. In either case, the Compiler informs the user at end-of-compilation which device contains the file listings.
62	PROL	PR	OL	This file is required if the LIST option is not selected, otherwise it is optional. This file contains the Compiler generated listings.
64	SORS	SO	RS	This file contains the COBOL source program.
65	UPDT	UP	DT	This optional file is used to update the source program. It is in the same format as the SORS file. It is only required if the update precompilation routine has been selected.
66	COPY	CO	PY	This optional file contains the COPY or INCLUDE library. It is a standard labeled multifile tape. It is only required when the COPY INCLUDE precompilation routine has been selected.
53	OWNC	OW	NC	This optional file contains user sequences. Its presence is dependent upon the source input.

5. Parameters

a. DEVPAR (Optional)

- 1) The Compiler has allocated additional memory in its pass-preassignment table to permit entry of parameters at compilation time in order to modify device assignment.
- 2) Format for these entries follows that presented for DEVPAR entries.

b. INFPAR Program (Optional)

- 1) This parameter allows the selection of only those options required for any particular compilation.
- 2) The options specified on the following page are preset by the Compiler; therefore, if this parameter is not entered, indicated options are in effect.
- 3) If entered, this parameter must be completed in its entirety; i.e., each column must contain an indicator entry.
- 4) When the Compiler input is an RCA multifile, this parameter must be present. This holds true whether the STACK COMPILE option or the SINGLE COMPILE option is selected.
- 5) When the Compiler input to a stack compile run is a batched input tape, INFPAR's may or may not precede the IDENTIFICATION DIVISION statement. When they are not present the Compiler generates an INFPAR without any options.
- 6) The format and content of this parameter are as shown on the following page.

INFPAR FORMAT

Column	Preset Value	Remarks
1-18	See Remarks	010131INFPAR000000
19	△	Blank.
20	0	Precompilation SEQUENCE SORT indicator. 0 - No 1 - Yes
21	0	Precompilation UPDATE indicator. 0 - No 1 - Yes, Input is recorded in RCA mode. T - Yes, Input is recorded in Non-RCA mode.
22	0	Precompilation PRIORITY SORT indicator. 0 - No 1 - Yes
23	0	Precompilation COPY/INCLUDE indicator. 0 - No 1 - COPY/INCLUDE from Library. 2 - Source COPY only.
24	0	Precompilation REPORT WRITER indicator. 0 - No 1 - Yes
25	0	Precompilation indicator - ability to dis- continue compilation prior to Phase I. 0 - No, continue compilation. 1 - Yes, inhibit compilation.
26	0	Dismount source input indicator - meaning- ful only if source is assigned to one of the work tapes. 0 - Source may be destroyed. 1 - Dismount source.
27	0	Cross reference listing indicator. 0 - No 1 - Yes
28	0	Diagnostic run indicator - ability to dis- continue compilation prior to process gen- eration. 0 - No, generate process. 1 - Yes, inhibit process generation.
29	0	Multifile indicator. 0 - No, source input is only file on tape or is the first file on a multifile tape. 1 - Yes, source is nth (n>1) file on a multifile tape and tape will be rewound.

INFPAR FORMAT (Cont'd)

Column	Preset Value	Remarks
30	0	2 - Yes, same as 1, but source file is not re-wound. Only to be used if source is assigned to an additional tape. NOTE verb processing indicator. 0 - Scan sentences and paragraphs for valid COBOL sentence structure including the inclosure of special characters (other than valid punctuation characters) within quotes but generate no object coding for those sentences and paragraphs containing the NOTE verb. 1 - Delete NOTE verb if it is the first verb in a paragraph, otherwise scan as above.
31-38	RCACOBOL	Eight-character file identification of the source program.
39	0	Sequence number shift indicator. 0 - No, do not retain original sequence number. 1 - Yes, retain original sequence number in column 73-78 of the updated source program.
40-45	000000	Collating sequence indicator. Zeros - RCA collating sequence. Nonzeros - contains the sequence and four-character sequence relative address of the user's non-RCA collating sequence.
46	0	This column refers only to source program input. In addition, information contained in this column is applicable only if a <u>zero</u> is specified in column 20. Special sequence check options. 0 - Check for out-of-sequence condition. This check requires a sequence number in first card. 1 - check for out-of-sequence condition. Advise user via error 118W but do not call for sequence sort. 2 - Check for out-of-sequence condition even if first card contains a blank sequence number. 3 - Do not check for out-of-sequence condition.
47-50	0000	Sort "normal" record length. Required only when sorting Symbol or Count Controlled records. Maximum record length used if zeros. This field corresponds to field 7 of the SORT IC22 Parameter. (See RCA 3301 Tape Sort and Merge System, 94-30-001.)

6. Typeout format

PROCESS ID	SOFTWARE TYPE	FUNCTION CODE	SUB-FUNCTION CODE	MESSAGE NUMBERS	
COBOL	C (Cobol)	P (Precompilation)	S1 (Sequence Sort)	32-33	
			S2 (Priority Sort)	15,20,34,36	
			U1 (Update)	37-43	
			P1 (Paper-Magnetic)	44	(C)
			R1 (Report-Writer)	20,55	(C)
			C1 (Copy-Include)	15,20,46-54	
		M (Monitor)	D1 (Device Assignment)	05-10	
			I0 (Input-Output)	11-12	
			M1 (Initialization and Termination)	13-18	
			I1 (INFPAR)	00-04	(C)
		C (Compiler)	11 (phase 1.1)	15,19-22	
			12 (phase 1.2)	15,19-23	
			14 (phase 1.4)	15,19-21,23	
			31 (phase 3.1)	24	(A)
			42 (phase 4.2)	25	
			72 (phase 7.2)	26-27	
			80 (phase 8.0-PRGN)	28-31	
			90 (Stack Compile)	70-77	

7. Typeouts - Normal and Error

MESSAGE	CAUSE	ACTION
CM1100 COMPUTE VERSION 1 CODE GENERATED CM1101 PRECOMPILE OPTION IGNORED CM1102 DISMOUNT OPTION IGNORED CM1103 MULTIFILE OPTION IGNORED CM1104 PRECOMPILE ONLY OPTION IGNORED CMD105 MOUNT SOURCE ON TRUNK X CMD106 IMPROPER DEVICE ASSIGNED TO SG/SQ.APD ADDRxxxx CMD107 DUPLICATE DEVICE ASSIGNMENT APD ADDR xxxx CMD108 N WK/TP [STACK] ASSIGNMENTS MADE AND SHOULD BE 4 [2] CMD109 NO OR IMPROPER DEVICE ASSIGNED TO PR/OL AND/OR LIST	Insufficient memory assigned to process for COMPUTE version 2 code to be generated. Indicator set to specify precompilation only but none of the precompilation routines were specified. Indicator not set for multifile source input and tape was assigned to one of the work tapes (or) indicator set to specify dismount source and source input was assigned to an additional tape, card reader, or paper tape. Indicator set to specify multifile and source input was not assigned to magnetic tape. Indicator was set to specify precompilation only but Report Writer was selected. Source input was assigned to one of the work tapes by the Compiler. Self-explanatory. SG/SQ refers to segment-sequence code associated with device. Two or more unique files assigned to the same device. Improper number of devices assigned to work tapes or stack compile tapes. Should be four work tapes and two or three stack tapes. (STC1 and STC2 mandatory for stack compile.) No device was assigned to either the PROL or LIST file (or) an improper device was assigned to one or both of these files.	None Condition ignored, compilation continues. Mount source input on actual device specified. Continue (02). Compilation discontinued. Correct erroneous device assignment and restart compilation.

7. Typeouts - Normal and Error (Cont'd.)

MESSAGE	CAUSE	ACTION
CMD110 DEVICE ASSIGNMENT ERROR, NONE AVAILABLE	Illogical error. Should not occur.	Restart compilation.
CMIO11 I/O PARITY ERROR, SUSPEND PROCESSING ERROR ON DEVICE N	Nonrecoverable parity error detected by FCP on indicated device.	Restart compilation.
CMIO12 FALSE END OF FILE DETECTED ERROR ON DEVICE	An illogical end-of-file was detected on indicated device due to tape and/or device error.	Compilation discontinued. Check tape and/or tape station. Recompile.
CMM113 LIST FILE ON TRUNK X	Successful compilation completed.	None required.
CMM114 IDENT PROCESS COMPLETED	Self-explanatory.	
CMM115 SEQUENCE ERRORS EXIST	Self explanatory. Error seq. no. placed in cols. 73-78 of updated source followed by **	
CMM116 DISMOUNT SOURCE INPUT AND REPLACE WITH WORK TAPE	Source input was assigned to one of the work tapes and the dismount option was selected.	Dismount source input and replace with work tape. Continue (02).
CMM117 RE-READY CARD INPUT DECK	A nonselected precompilation routine was determined to be required by the Compiler.	Reposition source deck to beginning label card. Continue (02).
CMM118 NO FURTHER COMPILER ACTION REQUIRED. [LIST ON TRUNK X] [IN PRINT FORMAT.]	Successful completion of precompilation phase(s) and the precompile only option was selected or errors caused suspension after completion of a precompilation phase. Location of list tape indicated if present. List will be copied into printer format if no printing on-line in phase.	None required.
CC1119, CC1219, CC1419 COMPILER SUSPENDED, MINIMAL SOURCE PROGRAM NOT PRESENT	Self-explanatory. Refer to Realcom COBOL Programming Techniques manual for minimum source program requirements.	Compilation discontinued.

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7. Typeouts - Normal and Error (Cont'd)

MESSAGE	CAUSE	ACTION
CC1120, CC1220, CC1420, CPS220, CPC120, CPRI20 CALLING SEQUENCE SORT	Indicator was not set to specify SEQUENCE SORT. Out-of-sequence condition was detected by Compiler.	Compiler automatically initiates SEQUENCE SORT.
CC1121, CC1221, CC1421 CALLING COPY & INCLUDE	Indicator was not set to specify COPY and INCLUDE. Determined to be required by Compiler.	Compiler automatically initiates COPY and INCLUDE.
CC1122, CC1222 CALLING REPORT WRITER	Indicator was not set to specify REPORT WRITER. Determined to be required by Compiler.	Compiler automatically initiates REPORT WRITER.
CC1223, CC1423 CALLING PRIORITY SORT	Indicator was not set to specify PRIORITY SORT. Out-of-sequence condition was detected by Compiler.	Compiler automatically initiates PRIORITY SORT.
CC3124 COMPILER SUSPEND- ED, DATA HIERARCHY OVER- FLOW AT SEQ NUM xxxx	The entries (in internal format) within a hier- archy exceeded the capacity of the table area in memory. A hierarchy consisting of: a) A procedure section header and all its paragraph headers. b) A record (01) entry and all its subordi- nates. Sequence number indicates the point within the particular division where the overflow occurred.	Compilation discontinued. Correct source by segment- ing program, deleting un- referenced paragraph headers or defining fewer subordinates within record entry.
(A) CC4225 COMPILER SUS- PENDED, NO DATA OUTPUT FOR DATA SEGMENT	Previous error caused the deletion of all entries in the segment; e.g., a data segment consists of files which were not SELECTED.	Compilation discontinued. Correct source errors and recompile.
CC7226 IDENT DIAGNOSTIC RUN COMPLETED	Successful diagnostic run completed.	None required.
CC7227 IDENT PROCESS GENERATION BYPASSED	Errors prevent successful process generation.	Correct source input and recompile.
CC8028 IDENT OBJECT PROGRAM ON TRUNK NO. X	Successful completion of process generation.	None required.

7. Typeouts - Normal and Error (Continued)

MESSAGE	CAUSE	ACTION
CC8029 END OF COMPILATION	Self-explanatory.	None required.
CC8030 WRONG SORT TAPE	Sort tape not assigned or wrong tape mounted on sort device.	Correct tape assignment and rerun.
CC8031 SGMT NO. IS NOT <u>NN</u>	Required Sort Process Segments not found. NN is 01 or 65.	Compilation dis- continued. Check Sort tape and recompile.
CC8032	Error in Process Description.	Compilation dis- continued. Illogical error. Recompile.
NNNN_103_TEXT	Illegal special character in the object of a Report Writer SOURCE statement. NNNN = Source sequence # (the Nth card is the input source program) TEXT = word con- taining error.	Compilation suspended.

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7. Typeouts - Normal and Error (Cont'd)

MESSAGE	CAUSE	ACTION
CPS132, CPS234 COMPILER SUSPENDED, CONSECUTIVE BLANK KEYS EXCEED 9999.	During processing of se- quence or priority sort, more than 9999 con- secutive cards were en- countered with no se- quence number.	Compilation discontinued.
CC8033	Error in OWN CODE	Compilation discontinued. Verify OWN CODE use and re- compile. (A)
CPS133 TWO SOURCE CARDS WITH KEY NNNNNN	During processing of se- quence sort, two source cards were found to contain identical keys.	Verify updated source to ensure that entries are in desired sequence. Compil- ation continues.
CC8034	No corresponding Pro- cedure Division for Pro- cess Description segment.	Compilation discontinued. Illogical error. Re-compile. (A)
CC8035	Non-recoverable tape error while reading from tape station NN.	Compilation discontinued. Check tape and/or tape station. Re-compile.
CC8036	Logical error on Sort Tape.	Compilation discontinued. Check Sort tape and re- compile. (A)
CPS236 INVALID PRIORITY NUMBERS EXIST	Self-explanatory.	Compilation discontinued after completion of priority sort. Errors will appear on LIST file.
CPU137 MOUNT UPDATE FILE ON TRUNK X	UPDATE input was assigned to one of the work tapes by the Compiler.	Mount UPDATE input on actual device specified. Continue (02).
CPU138 DISMOUNT UPDATE INPUT AND REPLACE WITH WORK TAPE.	UPDATE input was assigned to one of the work tapes by the Compiler.	Dismount UPDATE input and replace with work tape. Continue (02).
CPU139 SOURCE SEQUENCE ERROR CURRENT IS NNNNNN PREVIOUS IS NNNNNN	Self-explanatory.	Compilation discontinued.
CPU140 DUPLICATE SOURCE, SEQ #NNNNNN	Self-explanatory.	Verify updated source to ensure validity of update. Compilation continues.
CPU141 DUPLICATE UPDATE, SEQ #NNNNNN	Self-explanatory.	Compilation discontinued.
CPU142 DELETE #NNNNNN HIGH THAN LAST SOURCE.	Self-explanatory.	Compilation discontinued.

7. Typeouts - Normal and Error (Cont'd)

MESSAGE	CAUSE	ACTION
CPU143 COMPILER SUS- PENDED UPDATE ERROR #4	One of the following condi- tions: X = 1-No source input.* 2-No update input.* 3-No match for delete record. 4-Cols. 8-13 of delete< cols. 1-6. 5-UPDATE file out of sequence. 6-Delete followed by blank record. 7-Delete with blank sequence no. *Illogical Errors.	Compilation dis- continued. Cor- rect input and restart compilation.
CPP144 PAPER TAPE CON- VERSION ERRORS EXIST	Input format incorrect.	Compilation dis- continued after completion of paper tape con- version. Errors appear on LIST file.
CPC146 MOUNT COPY LIB- RARY ON TRUNK X	COPY library was assigned to one of the work tapes by the Compiler.	Mount COPY input on actual device specified. Con- tinue (02).
CPC147 DISMOUNT COPY LIBRARY AND REPLACE WITH WORK TAPE	COPY library was assigned to one of the work tapes by the Compiler.	Dismount COPY input and replace with work tape. Continue (02).
CPC148 UNSATISFIED COPY/ INCLUDE SEQ. #NNNNNN	Self-explanatory.	Compilation dis- continued after completion of COPY/INCLUDE.
CPC149 COPY/INCLUDE ERRORS EXIST	Self-explanatory.	Compilation dis- continued. Correct input and restart compilation.

7. Typeouts - Normal and Error (Cont'd)

MESSAGE	CAUSE	ACTION
CPC150 ENTRY TABLES COPIES EXCEED LIMIT	One of the following conditions: 1. <u>ENTRY</u> - refers to length of hierarchy to insert into source. If a record description, section, etc., consists of too many records, this message appears. 2. <u>TABLES</u> - refers to the number of COPY/INCLUDES. When the maximum no. has been exceeded, this message appears. 3. <u>COPIES</u> - refers to items to be copied, such as record descriptions, section, etc. When length of this list plus all qualifiers exceeds limits, this message appears. Refer to COPY/INCLUDE section for determination of stated limits.	Compilation discontinued after completion of COPY/INCLUDE. Correct and recompile.
CPC 151 REPL ERROR SEQ # NNNNNN	A word, data-name, etc., is too long and replacement does not take place. (A colon(:) is placed in col. 74 of the updated source to flag this error.)	Compilation discontinued after completion of COPY/INCLUDE. Correct and recompile.

(A)

(A)

3301 COBOL COMPILER (COBOL) - STACKED COMPILATION

1. Function

The stack compile function provides an enhanced compilation process by offering a wide variety of user options. The salient features of this function are as follows:

- Ability to compile more than one COBOL source program without operator intervention.
- Ability to accept batched source program input and create batched output listings for off-line printing.
- Ability to accept industry compatible source program input and create industry compatible listings for off-line printing.

This type of compilation is specified by entering an information parameter message at process initiation. The source program input will be reformatted, if necessary, to meet the normal compiler requirements. At the completion of a compilation, the output listings, the object program and the updated source program (if specified) will be copied to specific devices. When this copy pass is completed, the Compiler will re-initialize itself and begin the next compilation; continuing in this manner until all of the compilations have been completed.

NOTE: It is necessary to allocate 150 characters of memory when running STACKED compilations by way of the STLOC parameter for System Tape Generation.

2. Hardware Requirements

The following minimum machine configuration is required:

- Model 3303 Processor (60K)
- Nine magnetic tape stations (includes MLT)*
- Card reader

Additional memory will be utilized by the COBOL Compiler if available.

* Only eight magnetic tape stations are required if source input medium is the card reader.

3. Specifications

a. Input

Source program input medium may be magnetic tape or cards. The following chart illustrates the acceptable input combinations:

Recording	Input Medium		File Organ		Batching Factor		Labels	
Mode	Mag. Tape	Cards	Single	Multi	Unbatched	Batched	Stan.	Omitted
RCA	Yes			Yes	Yes		Yes	
RCA	Yes		Yes			Yes	Yes	Yes
RCA		Yes		Yes	Yes		Yes	
Compatible	Yes		Yes		Yes			Yes
Compatible	Yes		Yes			Yes		Yes
Compatible		Yes	Yes		Yes			Yes

Notes:

- 1) Single file, batched - Each COBOL source program is delimited by an INFPAR record or the IDENTIFICATION DIVISION record if no INFPAR is present. The delimiter record may occupy any record position within the batch. Padding of batches is not required between programs. A maximum of 25-records per batch is permitted.
- 2) An RCA multifile must be an unbatched, standard labeled file and it must conform to the 3301 FCP standard file format.
- 3) If input is a labeled file, refer to stack and program INFPAR's for label identification information.
- 4) Labels omitted - For compatible input, a sentinel may not be present at the beginning of the file but must be present at the end of the file. For RCA the 3301 standard convention is followed.

b. Output

Outputs from the COBOL Stacked Compiler are a stacked listings tape, object programs tape stacked in master library format (MLT) and an optional stacked source programs tape.

1) Tape List (STC1)

This tape is a single file and contains the Compiler produced listings in printer-destined format for each of the COBOL source programs. The format of this tape is as follows:

- a) Labeled or unlabeled (if labeled, the label ID is PRNTRΔOP).
- b) Sentinel at end of file if Compatible O/P.
- c) Batched 10-records per block.

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d) Recorded in RCA or compatible mode.

NOTE: The Process Description is available within this file regardless of whether or not PROL has been specified. The Process Description will not be available on the on-line printer listing.

2) Object Programs (STC2)

The object programs are produced in master library format (MLT) in the order in which they were compiled. The over-all MLT (i.e., consisting of all the programs compiled) will be a standard labeled file. The label ID of this file is MLT.

3) Updated COBOL source program (STC0)

This file is an optional RCA multifile is unbatched, 80-character, card-image record format. Each file consists of an individual COBOL source program and the Label ID's correspond to those of the source input.

LOGICAL DEVICE NUMBER	File- Name	Seg. No.	Seq. No.	Remarks
67	STC1	ST	C1	This optional file is required if the STACK COMPILE option is selected. It will contain the stacked listing output.
70	STC2	ST	C2	Same as STY1. It will contain the stacked MLT output.
71	STC0	ST	CO	This optional file may be requested by the user when the STACK COMPILE option is selected. It will contain the updated source programs in RCA multifile format.

4. Device Assignment

a. Source Input device (SORS), four Work Tape devices (WKTP), Tape List device, (LIST) and two stacked output tapes (STC1/STC2) are always required. Updated Source tape (STC0) is optional.

b. Preassignment of Logical Pairs

1) The following files may be preassigned to compiler work tapes, subject to the restrictions noted below:

- A. SORS - COBOL source program
- B. UPDT - COBOL source correction
- C. COPY - COBOL COPY LIBRARY

2) Restrictions:

a) Preassignment is not allowed in Stacked Compile runs.

- b) Preassignment of the COPY LIBRARY file is allowed only if the COPY and INCLUDE option is specified on the INFPAR card and no other precompilation option is specified.
- c) Preassignment of the UPDT file is allowed only if the UPDATE option is specified on the INFPAR card.

NOTE:

If a work tape is preassigned to the COPY LIBRARY file (COPY) and the COPY and INCLUDE phase is suspended to call the SEQUENCE SORT, it will be necessary to replace the COPY LIBRARY file with a work tape. Upon the return from the sort, the operator must remount the COPY LIBRARY file on the device specified in the remount message. It is not possible to predict which device the compiler will assign in this case but it would be noted that the device assigned by the compiler takes precedence over a programmer pre-assignment.

5. Parameters

a. DEVPAR

The stack compile feature requires the assigning of three or four additional devices to the Compiler in order to operate. Devices must be assigned to the following files:

- Stacked source input.
- Stacked listing output.
- Stacked MLT output.
- Stacked updated source output (optional).

These will be requested on two optional DEVPARS. One of which will assign the two required tapes for stacked compilation and the other will assign the optional updated source output. The fourth device to be assigned is for the Source Input and cannot be a Compiler work-tape for Stacked Compilation.

b. INFPAR

When operating at the stack compile level it is necessary to communicate the exact input and output formats to the Compiler. This is accomplished through the use of a "Stack" INFPAR followed by an ED. This INFPAR is read from the card reader at process initiation and controls the Compiler throughout the entire stack run. Program INFPAR's are handled internally by the Compiler without the necessity of operator intervention.

1) Multifile

When the user selects the RCA multifile as his input format the standard program INFPAR's are read by the Compiler from the card reader. When this type of input is on cards, an INFPAR card and an ED card precede each source file beginning label card. An end card (END Columns 1-3) is necessary after the last ED card when source files are on tape, and after the end-label of the last source when source files are on cards to end the stacked compilations. When tape is the input medium, the INFPAR's are placed in the card reader in the same manner but without the intervening card source files.

The sequence of INFPARS for RCA multifile tape input is as follows:

```
INFPAR "Stack"  
ED  
INFPAR "Program"  
ED  
INFPAR "Program"  
ED  
etc.  
END (Columns 1-3)
```

Note:

1. Programs are compiled in the order the INFPAR's appear.
2. The first file on a multifile tape is not considered to be multifile and should be shown in this way on the INFPAR card.

2) Batched tape.

The sequence for batched tape input is as follows:

```
INFPAR "Stack"  
ED  
END (Columns 1-3)
```

INFPAR - NORMAL COBOL SOURCE PROGRAM INFPAR, BATCHED INPUT.

If an INFPAR record precedes each source program in the batched input, it will be passed to the Compiler. If none exists, the compiler will generate one for each program. The format for this record is described in operating procedures for single compilations.

3) INFPAR - "STACK" REQUIRED FOR STACKED COMPILE ONLY.

COLUMN	PRESENT VALUE	REMARKS
1-18	See Remarks	010150INFPAR000000
19		Blank.
20	0	S - denotes a stacked compilation run.
21	0	Input recording mode. 0 - RCA batched. 1 - Compatible. 2 - RCA multifile.
22	0	Input label indicator. 0 - Standard labels. 1 - Labels omitted.

COLUMN	PRESENT VALUE	REMARKS
22 (Cont'd)		Note: Not meaningful if input is an RCA multifile.
23	0	Stacked LISTING output recording mode. 0 - RCA. 1 - Compatible.
24	0	Output label indicator. 0 - Standard labels. 1 - Labels omitted.
25	0	Optional updated source output indicator. 0 - No 1 - Yes
26-27	00	Type of run. 00 - Normal cold start. NN - Restart at program #NN. NOTE: If input is RCA multifile and: a) column 36 is 0, then column 26-27 is not meaningful. b) column 36 is 1, then NN must be 01 and does not indicate program number.
28-35	Eight-character (File-ID.)	Only required when Column 22 is equal to 0. These eight characters represent the file-ID in the standard label of the batched input tape. Note: Not meaningful if input is an RCA multifile.
36	0	Restart rewind indicator. 0 - Restart with new output tapes, rewind. 1 - Restart with same output tapes, no rewind.

6. Stack Compile Restart

The following two restart options are available for use with Stacked Compile runs.

- a. Restart at time of interrupt using the same stacked output tapes without repositioning.
 - 1) Enter the number of the program that the restart is to begin with in cols. 26-27 of the stack INFPAR card.
 - 2) Set the Restart indicator to a 1 (col. 36 of Stack INFPAR card) to indicate no rewind for the stacked output tapes.
- b. Restart with new stacked output tapes mounted.
 - 1) Enter the number of the program that the restart is to begin with in cols. 26-27 of the Stack INFPAR card.
 - 2) Set the Restart Rewind indicator to a 0 (col. 36 of the Stack INFPAR card) to indicate normal tape positioning of the stacked output tapes.

7. Restrictions

- a. All stacked output tapes must be removed and replaced on a recovery. It is not possible to continue using the same output tapes due to the positioning problems during a run of this type.
- b. For all stacked compilations, the tape LIST is no longer an optional file. In the normal compilation, the user selects either a tape list file or an on-line print file, or both.
- c. If the input is RCA multifile on cards and precompilation call is necessary, operator manipulation of the card file will be required.
- d. Size of the minimum program must be greater than the batch factor for batched input.

8. Typeouts - Normal and Error

MESSAGE	CAUSE	ACTION
CC9070 STACKED LIST ON TRUNK X.	Successful completion of stacked compilation.	None required.
CC9071 STACKED MLT ON TRUNK X.	Successful completion of stacked compilation.	None required.
CC9072 NO STACKED OUTPUT.	None of the COBOL input programs were successfully compiled.	Correct input and restart compilation.
CC9073 IDENT	Ident of program placed on stacked MLT.	None required.

8. Typeouts - Normal and Error (Cont'd)

MESSAGE	CAUSE	ACTION
CC9074 ED NOT PRESENT, VERIFY ROR I/P.	Self-explanatory.	Correct card deck and continue.
CC9075 LIST NOT SPECIFIED, REQUIRED FOR STACK COMP.	Self-explanatory.	Compilation discontinued correct device assignments and restart.
CC9076 NO INFPAR OR END CD READ, VERIFY I/P.	Self-explanatory.	Correct card deck and con- tinue.
CC9077 I/O PARITY ERROR, STACK SUS- PENDED DEVICE X.	Self-explanatory.	Restart compilation.
CC9078 OPTIONAL O/P IGNORED, NO DEVICE ASSIGNED.	Self-explanatory.	None.

3488 DATA FILE ALLOCATOR ROUTINE (ALLOC)

1. Function

The Data File Allocator reserves 3488 storage for data files, generates a "superfile" from predefined files, and deallocates data files and/or "superfiles." This routine provides storage reservation and file definitions.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

3. Device Assignment

Logical Device No.	File Name	Seg. No.	Seq. No.
D	*FILINDX	01	08
D	*MAGDESC	01	09
D	*FILDESC	01	10
D	*PARAMTRS	01	11

4. Process ID - ALLOC

5. Parameters - (Read from *PARAMTRS file)

Refer to 3301 Service Routine Library (94-30-002).

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
ALLOC	B80401	BASE_FILE IIIIIII NOT ALLOCATED	Request for superfile definition. The indicated base file was not allocated.	Allocate the base file before defining the superfile. Reintroduce parameter.
ALLOC	B80402	BUCKET_SIZE_ ERROR	Request for superfile definition. All base files do not have identical bucket sizes.	Correct parameter and reintroduce.
ALLOC	B80403	XXXXXXXXXXXX XXXXXX	Card or block number greater than 255. Unit word is displayed.	Correct parameter and reintroduce.
ALLOC	B80404	CONTROL_FILE_ SATURATION	No room remains in the control file for additional allocation.	Either reinitialize the system or deallocate the unused files.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
ALLOC	B80405	DEALLOCATION_ COMPLETED	Self-explanatory.	None.
ALLOC	B80406	DFAEND ENTERED _PRIOR_TO_ DFAUNW	Parameters are out of sequence, or no unit word parameter was applied.	Correct parameter and reintroduce.
ALLOC	B80407	FILE_IIIIIIII_ ALLOCATION_COM- PLETED	Self-explanatory.	None.
ALLOC	B80408	FILE_IIIIIIII_ GREATER_THAN_ 99	Exceeded restriction of 99 blocks to a bucket.	Correct parameter and reintroduce.
ALLOC	B80409	FILE_IIIIIIII_ IS_SUB_TO_SUPER IIIIIIII	An attempt is being made to deallocate a file that is a base to a superfile.	Warning message. Verify that con- dition is valid and type a 1 to continue. Type a 2 to terminate task.
ALLOC	B80410	FILE_IIIIIIII_ NOT_FOUND	An attempt has been made to deallocate a file that is a base to a superfile.	None. Processing continues.
ALLOC	B80411	FILE_NAME_ IIIIIIII_ ILLEGAL	An attempt has been made to allocate a file whose File ID is not alphanumeric.	Correct File ID and reintroduce parameter.
ALLOC	B80412	FILE_IIIIIIII_ PREVIOUSLY ALLOCATED	An attempt is being made to allocate a file whose File ID is equivalent to a currently allocated file.	Correct parameter and reintroduce.
ALLOC	B80413	FIRST_PARAMETER_ NOT_DFASRT	Self-explanatory.	Correct parameter and reintroduce.
ALLOC	B80414	MAGAZINE_XXXX_ NOT_OPENED	An attempt has been made to allocate a file, of which all or part is to be assigned to a mag- azine that has not been entered into the system.	Initialize the mag- azine, or redefine the unit word; re- introduce param- eter.

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MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
ALLOC	B80415	COLUMN_19_OF DFASRT_INCORRECT	Self-explanatory.	Correct parameter and reintroduce.
ALLOC	B80416	FILE_IIIIIIII_ CURRENTLY_A_ SUPER	A superfile is being defined whose base file includes a superfile.	Correct parameter and reintroduce.
ALLOC	B80417	UNIT_WORD_ OVERLAP	An attempt was made to define a unit word within the boundaries of an existing unit word.	Correct parameter and reintroduce.
ALLOC	B80418	FILE_IIIIIIII_ NOT_FOUND	Control files are inconsistent *FILINDX Vs *FILDESC	None. Processing continues.
ALLOC	B80419	INVALID_PARAMETER	Input parameter is not DFASRT, DFAEND, or DFAUNW.	Correct parameter and reintroduce.
ALLOC	B80420		This message follows all recoverable error messages.	Examine preceding message, correct condition and type a 1 to continue. Type a 2 to terminate task.
ALLOC	B80499	END_OF_JOB	Self-explanatory.	None.

3488 FLAW PURGE ROUTINE (FLPRG)

1. Function

This routine eliminates any desired flaw entry from the Flaw Index of the Magazine Control Card.

2. Specifications

(A) Refer to 3301 Service Routine Library (94-30-002).

There are five types of input parameters to this routine. Type I purges all the flaws within a specified file. Type II purges all the flaws for a file within a specified magazine. Type III purges all the flaws for a file within a specified card and magazine. Type IV purges all the flaws within a specified magazine. Type V purges all flaws within a magazine for a specified card.

3. Device Assignments

Logical Device No.	File Name	Seg. No.	Seq. No.
01	CARDREAD	01	01
02	MAGCONTR	01	02
03	USERFILE	01	03

4. Process ID - FLPRG

5. Parameters - CARDREAD File

Refer to 3301 Service Routine Library (94-30-002)

6. Timeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
FLPRG	B80501	BAD_OP_CODE: XXXXX	XXXXX is not FPREQ or FPEND.	Correct parameter, and release to con- tinue.
FLPRG	B80502	BAD_SIZE_ CODE: XXX	XXX is illegal size code.	Correct parameter, and release to con- tinue.
FLPRG	B80503	FILE_TOO_ BIG: XXXXXXXX	File XXXXXXXXX has too many unit words to handle.	None. The user should flaw purge this file by mag- azine or by mag- azine and card only.
FLPRG	B80504		An I/O error has occurred when updating the flaw index of the magazine Contr. Card	Process is terminated

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3488 MAGAZINE INITIALIZER ROUTINE (MGINT)

1. Function

This routine prepares a new magazine that is to be entered into the system for the first time. It also adds or deletes control cards to a magazine, and opens or closes magazines in the system for future allocation.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

3. Device Assignments

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seq.No.</u>	<u>Seq.No.</u>
01	3488	01	06
02	3488	01	07
03	3488	01	09
04	3488	01	10
05	PRINTER	01	11
06	3488	01	12
07	3488	01	13
10	CARD	01	14

4. Process ID - MGINT

5. Parameters - ENTER_INITIALIZER_PARAMETER

a. Initialize	N_MMMM_PP_R	{ X }
b. Open	O_MMMM_PP_R	
c. Add Control Card	A_MMMM_PP_R	
d. Delete	D_MMMM_PP_R_CCC	
e. Close	C_MMMM	
f. End	END	

where:

CCC = decimal card number
MMMM = magazine serial number
PP = decimal magazine location (00-15)
R = Read/Write Head (0-7)
X = user desires to write to every block on the magazine. A printed listing of all flaw blocks will be generated.

Note: Parameters can be entered into the system using the Console Typewriter and Card Reader.

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MGINT	B80601	IS_PRINTER_REQUIRED_Y_OR_N	A printer is required only if magazines are to be initialized and the "Write all Blocks" option is used.	Type <u>N</u> to indicate that printer is not to be opened. Type <u>Y</u> to indicate that printer is to be opened. If <u>N</u> is typed, and the "Write all Blocks" option is used, the message will be typed again.
MGINT	B80602	ENTER_INITIALIZER_PARAMETER	Parameter may be typed.	Type parameter and release.
MGINT	B80603	PARAM_PROCESSED_OK	This message is typed for each parameter that has been processed properly.	None.
MGINT	B80604	PARAM_ERROR (PARAMETER) (ERROR POINTER)	Invalid parameter has been entered. Second message indicates the typed parameter. Third message contains a pointer (↑) indicating the error.	Correct parameter and retype.
MGINT	B80605	MAG#_XXXXX NOT_IN_*MAG_DESC_FILE	A parameter has been entered requiring a magazine (XXXXX) that is not present in the file.	Enter correct serial number and continue.
MGINT	B80606	FLAW_CARD#_XXX_IS_NOT_EMPTY	Attempt is made to delete a magazine control card which is not empty. This card will be processed as the last magazine control card.	Purge flaws and re-initiate process.

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<u>PREFIX</u>	<u>CODE</u>	<u>VARIABLE DATA</u>	<u>MEANING</u>	<u>ACTION</u>
MGINT	B80624	3488 Inoperable	The 3488 unit is in an inoperable condition.	Correct the situation. Type "1" to continue. Type "2" to terminate.
MGINT	B80625		An unrecoverable error has occurred while processing a magazine control card.	Processing for this function cannot continue. Type "2" to terminate or if processing is to be continued with the next parameter, type "1".
MGINT	B80626	Mag#_XXXXX_ ON_LINE_AT_ X_XX	Mag serial # XXXXX is on-line at unit X position XX.	If parameter data agrees, type a "1" to continue, otherwise, correct the parameter & type a "1". To terminate processing type a "Ø".

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L.W.

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3488 SYSTEM INITIALIZER (SYINT)

1. Function

This routine generates 3488 system control files and magazine control cards for any of the magazines to which the system control files are assigned. Use of this routine is usually a one-time requirement per system.

2. Specifications

See 3301 Service Routine Library (94-30-002)

3. Device Assignments

Logical Device No.	File Name	Seg. No.	Seq. No.
01	3488_ _ _ _	01	10
02	PARMTERS	01	11

4. Process ID - SYINT

5. Parameters

See 3301 Service Routine Library (94-30-002)

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
SYINT	B80301	INVALID_PARAMETER_#_XX.	The parameter identified by XX is invalid.	Correct and parameter and rerun.
SYINT	B80302	FLAW_DETECTED_ON_CARD_#_XXX_MAGAZINE_#_XX_REPLACE_CARD_AND_RERUN.	A nonrecoverable parity error is detected during the creation of a magazine control card.	Replace card and rerun.
SYINT	B80303		Error recovery has failed to recover from an abnormal condition.	Determine the corrective action by examining the Error Recovery Messages and rerun.
SYINT	B80399	END_OF_JOB	Normal EOJ message.	No further action.

This page was deleted
by #94-16-000-1 (August,
1965) revision.

3488 DATA COPY ROUTINE (88CPY)

1. Function

This routine copies files or portions of files used in the 3301/3488 programming system. Only areas that have been allocated previously by the DATA FILE ALLOCATOR are copied. All data is copied in logical bucket organizations. Although both input and output are restricted to 3488, the routine uses magnetic tape as an intermediate storage device when the input and output magazines are on the same 3488 unit. (This is an optional function.)

2. Specifications

See 3301 Service Routine Library (94-30-002)

3. Device Assignments

C			Logical	
	<u>Seg. No.</u>	<u>Seq. No.</u>	<u>Device No.</u>	<u>File ID</u>
	01	04	01	3488
	01	05	02	3488
	01	07	03	3488
	01	09	04	3485
	01	11	05	CRDR

4. Process ID - 88CPY

5. Parameters B80100 TYPE-IN PARAMETER.

a. Magazine Level

C MAGA [N] XXXXX_YYYYY

b. Card Level

C CARD [N] XXXXX_YYYYY_SSS_EEE

c. File Level

C FILE [N] IIIIIIII_00000000

d. Terminate Copy

STOP

where:

N = magnetic tape is not used
_ = magnetic tape is used
XXXXX = input magazine serial number
YYYYY = output magazine serial number
SSS = decimal starting card number
EEE = decimal ending card number
IIIIIIII = input file ID
00000000 = output file ID

6. Requirements

The System Initiator, console routine 22 (On-Line Catalogue Update), and the Data File Allocator must be run previous to this routine.

7. Timeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
88CPY	B80100_ TYPE-IN		Program is ready to process a parameter.	Type in parameter.
88CPY	B80101_ XXXXX		Magazine serial number specified is not in the on-line catalogue.	Run On-Line Catalogue Update (console routine 22). Type a 1 to get next parameter. Type a 2 to terminate.
88CPY	B80102_ XXX_XXX		A. Card number not numeric. B. Card number exceeds 255.	Type a 1 to get next parameter and continue. Type a 2 to terminate.
88CPY	B80103_ XXXX		Copy specified was not card, magazine, or file.	Type a 1 to get next parameter and continue. Type a 2 to terminate.
88CPY	B80105_ XXXXXXXXX		Input file ID was not found in the data file description file.	Correct parameter ID, or allocate and load proper input file. Type a 1 to get next parameter and continue. Type a 2 to terminate.
88CPY	B80108		Abnormal termination on 3488 unit.	Type a 1 to recover and continue. Type a 2 to terminate.
88CPY	B80109		Improper file ID length specified.	Correct parameter. Type a 1 to read next parameter and continue. Type a 2 to terminate.
88CPY	B80112		Abnormal 3488 output.	No recovery. Task terminates.

7. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
88CPY	B80113		Output file will not hold input file.	Type a 1 to get next parameter and continue. Type a 2 to terminate.
88CPY	B80114		Error on rewind.	No recovery. Task terminates.
88CPY	B80115		Cannot write to output device.	No recovery. Task terminates.
88CPY	B80116		Error on input.	Type a 1 to continue and accept data as is. Type a 2 to terminate.
88CPY	B80117		Error on reload.	Type a 1 to continue and accept data as is.
88CPY	B80199_ END_OF_ RUN		STOP parameter was read.	None.

3488 DUMP ROUTINE (88 DMP)

1. Function

This routine prints specified portions of the 3488 memory.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

(A)

Data is printed without regard to allocation or unit word structure. Data is printed four blocks to a page with magazine, card, and block number headings on the first page, and block number headings on succeeding pages.

3. Device Assignments

<u>Seg. No.</u>	<u>Seq. No.</u>	<u>Logical Device No.</u>	<u>File Name</u>
01	02	01, 02	PRNT
01	03	64	3488

(C)

4. Process ID - 88DMP

5. Parameters - B80200_TYPE_PARAMETER

a. Print

PRNT_PP_SSS_EEE_sss_eee_d
where

PP = magazine position within retrieval unit
SSS = decimal starting card number
EEE = decimal ending card number
sss = decimal starting block number
eee = decimal ending block number
d = device character: 0 thru 7

b. Terminate Print

STOP

The output device may be changed to the printer at Object Program Initiation by typing: 0102_AD500,0. (A)

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
88DMP	B80200	TYPE_PARAMETER	Program already to receive parameter.	Insert parameter through Console Typewriter.
88DMP	B80201	INVALID_MAGAZINE_NUMBER	Decimal magazine number is not 0-15.	Re-enter parameter with correct magazine number.
88DMP	B80202	INVALID_CARD_NUMBER	Decimal card number is not 0-255, or starting card is greater than ending card.	Re-enter parameter with correct card number.
88DMP	B80203	INVALID_BLOCK_NUMBER	Decimal block number is not 0-255, or starting block is greater than ending block.	Re-enter parameter with correct block number.
88DMP	B80204	INVALID_DEVICE_NUMBER	Decimal device number is not 0-7.	Re-enter parameter with correct device number.
88DMP	B80205	END_OF_JOB	STOP parameter has been read.	None. Task terminates.
88DMP	B80206	INVALID_REQUEST	Parameter is not a PRNT or STOP.	Re-enter parameter with correct function.
88DMP	B80207	- - - - -	ETW on output tape sensed.	Mount next reel, press RELEASE to continue.

(A)

3301/3488 CARD REPLACEMENT (88REP)

1. Function

This routine will load data from specified 3488 card(s) to magnetic tape, and then reload to the same card(s) or specified alternate card(s). Flaws will be deleted between the load and reload phase. This routine will also check the card extraction count of any designated card(s) within any magazine(s) in the 3488 system.

2. Specifications

See 3301 Service Routine Library (94-30-002).

3. Device Assignments

<u>Code</u>	<u>Seg. No.</u>	<u>Seq. No.</u>	<u>Logical Device No.</u>	<u>File Name</u>
88REP	01	06	01	3488
88REP	01	07	02	3485
88REP	01	07	03	3485
88REP	01	08	04	3488
88REP	01	09	05	CRDR

4. Process ID - 88REP

5. Parameters

See 3301 Service Routine Library (94-30-002).

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
88REP	B80800	ENTER_PARAMETER	The Console Typewriter has been assigned as the input device.	Enter parameter through the Console Typewriter.
88REP	B80801		An unrecoverable machine error has occurred during positioning of magnetic tape.	Type a 1 to correct condition and continue. Type a 2 to terminate task.
88REP	B80802		ETW has been sensed during positioning of tape. This will occur only if an incorrect tape has been mounted.	Type a 1 to mount correct tape and continue. Type a 2 to terminate task.
88REP	B80803		This is a warning message informing the operator that new output data has been requested and all other data on the output tape will be destroyed.	Type a 1 to continue. Type a 2 to terminate task.
88REP	B80804	XXXXXX	An invalid parameter has been received. XXXXXX is the Parameter ID.	Type a 1 to correct parameter and continue. Type a 2 to terminate task.
88REP	B80806		Unrecoverable machine error on input device.	None, process terminates.
88REP	B80807	XXXXXXXX	Card requested was not 000-255. XXXXXXXX is magazine and card number of invalid parameter.	None, invalid request is ignored and process continues.
88REP	B80808	XXXXXXXX	Magazine and card number XXXXXXXX has not been allocated to a file and therefore will not be processed.	None, processing continues with next parameter.
88REP	B80809	XXXXXXXX	Unrecoverable parity error has occurred on magazine and card number indicated.	Type a 1 to continue with data as is. Type a 2 to terminate task.

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
88REP	B80810		Unrecoverable machine error or magnetic tape.	None, process terminates.
88REP	B80811	XXXXXXXX	Unrecoverable parity error has occurred on tape input. XXXXXXXX is magazine and card number.	Type a 1 to bypass bad data block. Type a 2 to terminate task.
88REP	B80812	XXXXXXXX	Write parity has occurred during reload of magazine control card. XXXXXXXX is magazine and card number.	Type a 1 to retry. Type a 2 to terminate task.
88REP	B80813	XXXXXXXX	Magazine is not online. XXXXXXXX is magazine and card number.	None, invalid request is ignored and process continues.
88REP	B80814		Unrecoverable machine error on 3488.	None, process terminates.
88REP	B80815	XXX	Card number XXX has not been allocated to a file and therefore, no processing will be attempted.	None, card number XXX will be ignored and process will continue.
88REP	B80816		Immediate copy and replacement parameter has been requested (CPYREP) and all cards have been loaded to tape.	Replace old card with new ones and type a 1 to reload information. Type a 2 to terminate task.
88REP	B80817	XXXXXXXX	Magazine and card number XXXXXXXX cannot be located on present input tape.	None, parameter is ignored and process continues with next parameter.
88REP	B80819		Tape positioning has been requested during immediate replacement.	Type a 1 to rewind tape and create new data. Type a 2 to terminate task.

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
88REP	B80820	XXXXXXXX	Card has either reached or exceeded prescribed number of extractions.	None, processing continues.
88REP	B80821	XXXXXX	An invalid parameter has been used in attempting to replace Magazine Control Cards.	None, process request a new parameter.
88REP	B80899	END_OF_RUN	Self-explanatory.	None.

(Pages IV-87, IV-88, and IV-89 were deleted
by revision, September, 1966.)

6. Timeouts - Normal and Error (Cont'd)

MESSAGE	MEANING	ACTION
SERVICE_TABLE_ADDRESS_ERROR	Service table address not 1000's oriented or exceeds HSM limits.	Correct parameter. Reinitiate COMPAK generator.
TABLE_N_NOT_100'S_ORIENTED	Translate table not 100's oriented.	
SYSPAR_MISSING	An ENDPAR parameter was read and no SYSPAR was read.	
ALTERNATE_STACKS_NOT_LEGAL_YET	A TABLEC parameter was read. This function is not implemented for COMPAK I.	
TAG_IS_ILLEGAL	Tag is either 0 or 1 in TABLEA or TABLEB.	
SAME_TAG_IS_USED_TWICE	Same tag is used twice.	
STACK_NN_IS_UNUSED	No Line Slot uses this stack.	
USELESS_STACK_REQUESTED	Input stack requested when there is no input stacking or an output stack was requested when there is no output stacking.	
SYMBOLIC_OP_NOT RECOGNIZED	A parameter had an invalid operation code.	
USELESS_TRANSLATION_REQUESTED	Input translation requested on an output-only Line Slot or vice versa.	
USER'S_PROCESS_NOT_ON_MLT	The process ID as specified in the SYSPAR parameter was not found on the input MLT.	Check the SYSPAR parameter for proper spelling of the process ID. Also check the input MLT for that process. Reinitiate COMPAK generation.
LOGIC_BUG_AT_NNNN--_TAKE_A_DUMP	An illogical path was taken on a test. The P-Register is given at NNNN.	Correct the condition and reinitiate.
IO_ERROR:_NNNNNNNNNN_CAUSES_NN	An IO error was detected while merging the MLT and the generated sequences.	Correct the condition and reinitiate.

SYSTEM TAPE GENERATOR (SYSGN)

1. Function

The System Tape Generator will tailor a Master Operating System tape, and create an Operating System tape which meets the requirements of the particular installation.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

a. Input

Input to the System Tape Generator is a Master Operating System, parameter messages, and any user own-code segments to be integrated into the Operating System.

1) Master Operating System (MASTER)

This tape contains all components of the RCA 3301 Operating System. In updating the master, this file is merged with INPUT to obtain a new master on file WORKTP.

2) Parameters (CARDS)

The user supplied parameters contain all information needed to tailor the Operating System for a given installation.

3) Own-Code segments (INPUT)

One or more assembly PLT's may be merged into the Operating System. Tapes must have omitted or standard tape labels. If available, two devices can be assigned to this file. If option 2 is selected, this file allocation is ignored.

b. Output

Output from the System Tape Generator is an Operating System tailored for the installation and an updated Master Systems tape.

1) Operating System (OUTPUT)

This tape will contain the generated Operating System.

2) Updated Master Operating System (WORKTP)

This tape will contain an updated master tape including the merged contents of the MASTER and INPUT tapes. Normally this would not be required at a user installation unless the FIXHSM parameter is used. If more than one input exists, WORKTP will contain the master for the second INPUT, and MASTER will receive the new master tape. These two files are alternated for each INPUT. If an odd number of INPUT tapes is to be put on the master, the new master will be on file WORKTP. If an even number of INPUT tapes is to be put on, the new master will be placed on file MASTER.

Parameter Output (PRINTER)

- 3) This file receives the edit of the user parameters and the sequence origin and size of each sequence on the OUTPUT tape.

* unless you have
own code sections
if "NONE" doesn't work
bypass it.

3. Device Assignment

Logical Device No.	File Name	Seg. No.	Seq. No.
01	WORKTP	01	02
02	MASTER NON-EXECUTABLE	01	03
03	OUTPUT	10	21
04	CARDS	05	13
05, 06	INPUT NONE *	01	04
07	PRINTER	05	14

4. Process ID-- SYSGN

5. Parameters

a. Three options may be selected when the message "SYSGN_SELECT_OPTION" is typed:

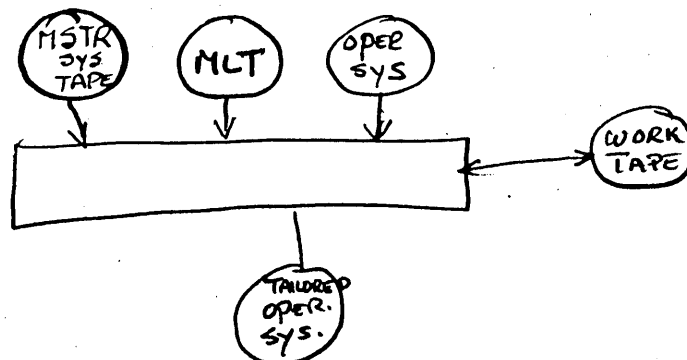
1) Option 1 causes Phase 1 only to be executed. This phase updates or creates the master Operating System tape. The only output of Phase 1 is a new Master Operating System tape.

2) Option 2 causes Phase 2 only to be executed. Output is a tailored Operating System Tape. This would normally be the option selected if user own-code segments are not present.

3) Option 3 causes Phases 1 and 2 to be executed.

b. The actual SYSGN parameter messages should be contained on the file CARDS.

~~NORMAL~~



6. Typeouts - Normal and Error

a. Normal Typeouts

MESSAGE	MEANING	ACTION
ANY_MORE	SYSGN Process desires to know if more than one PLT and/or MLT is to be added to the master.	Type N if no. Type Y if yes.
OUTPUT_MASTER_IS_ON_TK#_XX	Indicates location of the new Master Operating System.	None.
REPLACE_MASTER_WITH_WORK_TAPE_TK#_XX	Master Operating System tape may be replaced with work tape.	Replace with work tape. If an even number of input PLT's and MLT's are put on the master, the new master will be on MASTER. If an odd number (1,3,etc.) is present, the new master will be on WORKTP.
SEGMENT_XX	Informative typeout indicating the segment being merged.	None.
SYSGN_SELECT_OPTION	Parameter must be supplied indicating the SYSGN phases desired.	Type: 1 - execute Phase 1 only. 1N - execute Phase 1 only. No input MASTER is mounted. 2 - execute Phase 2 only. 3 - execute Phase 1 and 2. 3N - execute Phase 1 and 2. No input MASTER is mounted.

b. Error Typeouts

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
SYSGN_	14E002	_XXXX	Illegal device type code entry XXXX in ROLBAK parameter.	None. Processing will continue.
SYSGN_	14E003	_NNT	Illegal device number (NN), illegal device type (T), or duplicate device number in DEVICE parameter.	None. Processing will continue.
SYSGN_	B40801	_XX_YYYY	Sequence XX is greater than 3990 characters. Actual size = YYYY.	None. Sequence was deleted.
.C	B40804		Illegal condition. First input was MLT, and no MASTER was present.	Use 02 console routine to return to typeout SELECT_OPTION
.0	B40805	00	Input PLT format is incorrect.	Correct PLT and reinitiate SYSGN.
.0	B40806	00	Input PLT is not a valid Operating System assembly tape.	Use 02 console routine to continue and ignore this PLT.
.0	B40825	00	Invalid user parameter was read. Parameter was typed in preceding message.	Correct parameter and use 02 console routine to continue.
SYSGN_	B40826	_SQ_XX_NOT_ON_MASTER	Sequence XX is missing from the MASTER tape.	None. Processing will continue.
.0	B40827	00	PIN will be preceded by typeout SYSGN_NNT. The device type NNT indicated is not a valid DEVICE entry.	None. Device will be eliminated from the APD table.
SYSGN_	B40828	_NO_SIZE_ENTRY_TYPE_IN_XXXXXX.	SIZE parameter was omitted.	Type six-character memory size, e.g., 080000.
SYSGN_	B40829	_SIZE_INCORRECT_TYPE_IN_XXXXXX.	SIZE entry is incorrect.	Type in six-character entry e.g., 060000.

b. Error Typeouts (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
.0	B40830	00	DEVICE parameter not present.	Use 03 console routine to terminate the process.
.0	B40831		Abnormal termination occurred on MASTER tape.	Use 03 console routine to terminate the process.
.0	B40832	00	Abnormal termination occurred on CARDS device.	Use 03 console routine to terminate the process.
.0	B40833	00	Abnormal termination from the printer.	Use 03 console routine to terminate the process.
.0	B40834	00	This message will be preceded by the message SYSGN_NN. Hundreds orientation has been requested for an invalid sequence NN.	Correct parameter and use 02 console routine to continue.
.0	B40835	00	This message will be preceded by the message SYSGN_NNNN. Number of sectors (NNNN) for DRMSIZ or DRINDX parameter is in incorrect format.	Correct parameter and use 02 console routine to continue.
SYSGN_	B40836	_NO_DRUM_ENTRY_FOR_PPP PPP	The specified parameter PPPPPP is needed for drum processing.	None. Processing will continue without it.
SYSGN_	B40837	_PPPPPP_ AAAAAA	The parameter indicated contains a nonnumeric size. PPPPPP=parameter AAAAAA=size	Type in correct four- or six-character size.
(A) SYSGN_	B40838	-----STLOC_ -----0000	SIZE entry in STLOC parameter card contains 0000.	Type in correct four-character SIZE to continue
.0	B40850	00	Abnormal termination on output tape.	Use 03 console routine to terminate the process.
.0	B40851	00	Abnormal termination on input master.	Use 03 console routine to terminate the process.

b. Error Typeouts (Continued)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
.0	B40852	00	Abnormal termination on work tape.	Use 03 console routine to terminate the process.
SYSGN_	B40860	_XX_INVALID_SEQ._REFERENCED_BY_SEQ._XX.	A sequence has been referenced that is not on the output tape. User should validate Operating System references within an E series user own-code segment.	None. Reference is not floated.

3301 FORTRAN IV (FORTR)

1. Function

The 3301 FORTRAN IV Compiler translates source programs into machine code for execution with the FORTRAN IV Operating System. The FORTRAN IV Operating System provides for compilations, immediate execution of programs following compilation, or execution of previously compiled or assembled programs.

2. Specifications

- a. Source input may be card or magnetic tape converted from cards using the 3301 FORTRAN Card-to-Tape routine (part of the FORTRAN Monitor) or the 301 FORTRAN Card-to-Tape routine.
- b. For definitions of source input, see the functional description of the 3301 FORTRAN IV Operating System in the REALCOM FORTRAN IV Programmers' Reference Manual (94-24-000).

3. Device Assignment

One tape station, a card reader and a printer (or optional tape stations) are always required. Additional tape stations are required as indicated by remarks.

Actual Device	File Name	Seg. No.	Seq. No.	Remarks
40	LOGICAL READER	07	08	Required by object program as needed.
50	LOGICAL PRINTER	07	09	Required by object program as needed.
44	LOGICAL PUNCH	07	10	Required by object program as needed.
01	LOGICAL 1	07	11	Required for compilations.*
02	LOGICAL 2	07	12	Required for compilations.*
03	LOGICAL 3	07	13	Required for compilations.*
04	LOGICAL 4	07	14	Required for "EXECUTE" JOBS*
40	LOGICAL 5	07	15	Always required.
50	LOGICAL 6	07	16	Always required.
44	LOGICAL 7	07	17	Required for FORTRAN compilations using card output.*
11	LOGICAL 8	07	18	Always required.

*Also required for object programs as needed.

4. Process ID - FORTR
5. Parameters - none
6. Special Functions

Additional functions are provided by setting the P register via the 02 console routine to go to a selected location. These are as follows:

02_FORTR_01_000010	*Restart complete FORTRAN run.
02_FORTR_01_000020	*Go to next job of FORTRAN run. This function is not available after an *FINISH card has been processed.
02_FORTR_01_000030	Re-execute current job from absolute tape. This function is available only for jobs that do not use Logical 8 as a work tape.
02_FORTR_01_000040	Terminate run. This is to be used for writing E/F, E/D symbols and rewinding Logical 6 and 7 when an *FINISH card has not been processed and Logical 6 and 7 are assigned to tapes.
02_FORTR_01_000050	Card-to-Tape. This transcribes onto the tape assigned to Logical 5 from the card reader, assigned to the Logical Card Reader, card images in FORTRAN Format.
02_FORTR_01_000060	Fixcon Conversion routine. This is used as part of the procedure for adding library functions to the FORTRAN System Library on the MLT.
02_FORTR_01_000070	Restart job last processed from systems input unit. This is available only if Logical 5 is assigned to a tape unit.
02_FORTR_01_000080	Dump Memory. This will dump all memory excluding the highest 20,000 characters.

7. Typeouts: Normal

<u>MESSAGE</u>	<u>MEANING</u>	<u>ACTION</u>
*JOB	Start of job.	None.
*DATA	Start of job execution.	None.
EXECUTION DELETED	Print record on Logical 6 indicates reason for deletion.	

*A PIN 0 is located at seq. 01 + 000000 (location 1800 in a non-multiprogramming mode) which can be used as needed for reinstating operating system control.

7. Typeouts: Normal (Cont'd)

<u>MESSAGE</u>	<u>MEANING</u>	<u>ACTION</u>
*PAUSE (message)	Operator directive.	As indicated by printout.
*COMMENT (message)	Operator directive.	As indicated by printout.
*SYSTEM	Indicates I/O units required. Cols. 8 to 18 indicate I/O units for the respective device sequences 08 to 18 as follows: I = master reel O = non-master reel blank = not used (absence of an *SYSTEM card indicates Logicals 1 to 8 are required with logical 5 on master reel.)	Prepare I/O units as indicated by meaning.
*FINISH	End of run.	None.
.0 END RUN	Self-explanatory	Give 02-FORTR-01-000010 to restart run if desired.
.0 END DUMP	Self-explanatory	Give 02-FORTR to continue at next job.
.0 END CDTP	Self-explanatory	Give 02-FORTR to continue at next job.
.0 0000 nnnn	User PAUSE n.	Give 02-FORTR to continue.
.0 GEN-PIN	Self-explanatory	Reached as a result of operator setting P to 1800 to permit re-entry into operating system as desired.

FORTTRAN IV System Error Halts:

These halts are preceded by the following 26 characters:

%%%%_12P636_FORTR_XXXXXX_

where XXXXXX is the address where the halt occurred.

<u>CHARACTERS</u> 27 - 36	<u>MEANING</u>	<u>ACTION</u>
▣ 0 0001XXXX	Nonrecoverable hardware error in the buffering routine, other than ETW. XXXX is the address of the device region.	Correct hardware condition and re-initiate the process.
▣ 0 00020000	Systems input unit has been specified for a non-formatted output statement.	Correct source input and restart job or continue to the next job.
▣ 0 00030000	Systems input unit has been specified for a formatted output statement.	Correct source input and restart job or continue to the next job.
▣ 0 00040000	Record size specified by FORMAT statement exceeds maximum allowed.	Correct source input or data and restart job or continue to the next job.
▣ 0 00050000	Illegal nonnumeric character in input data.	Correct input data and restart job or continue to the next job.
▣ 0 0006XXXX	End of Tape warning (ETW). XXXX is the address of the device region.	Correct source input or data and restart job or continue to the next job.
▣ 0 00070000	Element of a FORMAT statement was not followed by a comma, slash, or right parenthesis.	Correct source input and restart job or continue to the next job.

FORTTRAN IV System Error Halts: (Cont'd)

<u>CHARACTERS</u> 27 - 36	<u>MEANING</u>	<u>ACTION</u>
0 00080000	Output routine halted attempting to round an integer variable. This error is caused by applying an E or F FORMAT element to an integer variable	Correct source input and restart job or continue to the next job.
0 00090000	Scale factor is more than one digit, or there is no numeric in front of the P, or the magnitude of the scale factor is greater than 8.	Correct source input and restart job or continue to the next job.
0 0010XXXX	Nonrecoverable hardware error in the READ routine. XXXX is the address of the device region.	Correct hardware condition and re-initiate the process.
0 0011XXXX	Nonrecoverable hardware error in the WRITE routine, other than ETW. XXXX is the address of the device region.	Correct hardware condition and re-initiate the process.
0 0012XXXX	Nonrecoverable hardware error in the END FILE routine. Where XXXX is the address of the device region.	Correct hardware condition and re-initiate the process.
0 0013XXXX	Nonrecoverable hardware error in the BACKSPACE routine. Where XXXX is the address of the device region.	Correct hardware condition and re-initiate the process.
0 0014XXXX	No E/F at beginning of tape. Where XXXX is the address of the device region.	Correct condition and re-initiate the process.
0 0015XXXX	Attempt to process E/F as input. Where XXXX is the address of the device region.	Correct source input or data and restart job.
0 BAD_CODE	Illegal print control. *	Re-initiate the process.
0 BAD_NMBR	Illegal Logical device specified.	Re-initiate the process.

* These halts cannot occur under proper operating conditions.

FORTTRAN IV System Error Halts: (Cont'd)

<u>CHARACTERS</u> 27 - 36	<u>MEANING</u>	<u>ACTION</u>
FORTR NON-RECOVER- ABLE ERROR ON LOGICAL n 0 MONI-ERR	Self-explanatory.	Correct hardware condition and re- initiate the process.
FORTR PURGE DATE ERROR ON LOGICAL n 0 MONI-ERR	Self-explanatory.	Mount correct tape and re-initiate the process.
FORTR SUM CHECK ERROR 02-SUM_CHK or 0_ _ _ _ _	Card reader error.	Re-insert last 2 cards read in hopper and issue a 02_ FORTR to continue.
0_NO_<Tx	No E/F on trunk x	Re-initiate process.
0 NORM_ERR	Nonrecoverable error on Logical unit 3 or 8.	Correct hardware condition and re- initiate the process.
0 PCH_ERR_	Nonrecoverable error on Logical unit 7.	Correct hardware condition and re- initiate the process.
0 PRT_ERR_	Nonrecoverable error on Logical unit 6.	Correct hardware condition and re- initiate the process.
0 READ_ERR	Attempt to READ Logical units 4, 6, or 7. * Nonrecoverable error on Logical unit 5.	Re-initiate the pro- cess. Correct hardware condition and re- initiate the process.
0 RWD_ERR_	Attempt to REWIND Logical units 4, 5, 6, or 7. * Device inoperable when REWIND was attempted.	Re-initiate the pro- cess. Correct condition and continue.
0 SIMO READ	Nonrecoverable error on Logical unit 1 or 2.	Correct hardware condition and re- initiate the process.
0 WRT_ERR_	Attempt to WRITE on Logical unit 5 Or 6. *	Re-initiate the pro- cess.

*These halts cannot occur under proper operating condition.

FORTTRAN IV System Error Halts: (Cont'd)

<u>CHARACTERS</u> 27 - 36	<u>MEANING</u>	<u>ACTION</u>
0 WRT_ERR_ (Cont'd)	Attempt to WRITE a record with improperly specified LHE and RHE addresses. *	Re-initiate the process.
	Nonrecoverable error on Logical unit 1, 2, or 4.	Correct hardware condition and re-initiate the process.
	Attempt to WRITE a one-character record other than E/F or E/D.*	Re-initiate the process.

*These halts cannot occur under proper operating conditions.

3488 UTILIZATION REPORT ROUTINE (UTRPT)

1. Function

This routine provides the capability of listing storage assignment and flaw information. Storage assignment may be listed by file or magazine, depending on user option. The flaw information report shows the location of flaws for each magazine.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002)

3. Device Assignment

<u>Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>	
	IN_PARAM	01	03	
	FS_FILIN	02	06	(3488)
	FS_FILDE	02	07	(3488)
47	FS_OUTPT	02	08	
47	MS_OUTPT	03	13	
	MS_MAGDE	03	14	(3488)
	MS_FILIN	03	15	(3488)
	MS_FILDE	03	16	(3488)
47	FR_OUTPT	04	20	
	FR_MCKX	04	21	(3488)
	ONLNCAT	04	22	(3488)

4. Process ID - UTRPT

5. Parameters

Refer to 3301 Service Routine Library (94-30-002)

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
UTRPT	B80701	PARAM_ERR	Input parameter is wrong.	Reinitiate process and enter correct parameter.
UTRPT	B80702		Abnormal termination of Input device.	Correct device and re-initiate process.
UTRPT	B80703		Illegal bucket-bustout reading *FILDESC; i.e. *FILINEX & *FILDESC are inconsistent.	Correct control files and reinitiate process.

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
UTRPT	B80704		Illegal EOF on *FILDESC.	Correct control files and re-initiate process.
UTRPT	B80705	FIL_ID_UNALOC _FFFFFFFF.	Storage report was requested for file FFFF_FFFF: this file ID does not occur in *FILINDX.	None. Run does not stop.
UTRPT	B80706	MAG_XXXXX_NOT_OPEN	Storage by magazine for magazine XXXXX cannot be given because serial no. does not occur in *MAGDESC.	None. Run does not stop.
UTRPT	B80707	XXXXXX	Magazine serial number XXXXX has no file allocated to it.	None.
UTRPT	B80708	NO MAGZNS ON LINE	On-line catalogue on 3488 contains no magazine serial numbers.	Run console routine 22 and reinitiate process.
UTRPT	B80709		Abnormal termination of device while reaching *FILINDX.	Correct condition and reinitiate process.
UTRPT	B80710		Abnormal termination of device while reading *FILDESC.	Correct condition and reinitiate process.
UTRPT	B80711		Abnormal termination of printer.	Correct condition and reinitiate process.
UTRPT	B80712		Abnormal termination of device while reading *MAGDESC.	Correct condition and reinitiate process.

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6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
UTRPT	B80713		Abnormal termination of device while reading magazine control card.	Correct condition and reinitiate process.
UTRPT	B00799	END_OF_JOB	Self-explanatory.	None.

TASK GENERATOR (TSKGN)

1. Function

The Task Generator generates a task description. The task is generated from user supplied Task Description parameters. The generated task description is placed on the output MLT in sequence by process/task ID number.

2. Specifications

Refer to Appendix O of this manual.

(A)

- a. Input may be a one- or two-tape MLT. The output MLT will be in the form of the input MLT; e.g. an input two-tape MLT will cause an output two-tape MLT to be generated.
- b. The OIP_MLT is not required when the user desires to create an output MLT containing only task descriptions. This output MLT would then have to be merged with an MLT containing the processes which make up the tasks. The output MLT will be in two-tape format.

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Segment Number</u>	<u>Sequence Number</u>
01	_WK_TAPE	01	01
40	_IP_PRAM	01	02
50	_OP_PRNT	01	03
02	OIP_MLT	02	05
03	_OP_MLT	02	06

4. Process ID - TSKGN

5. Parameters

Refer to 3301 Realcom Operating System Manual (94-08-000).

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6. Typecuts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
TSKGN	B40900	XXXXX	Task (XXXXX) Parameters contained Format Errors.	Type: 0 - Terminate Process. 1 - Correct Parameters and re-insert. TSKGN will start over. 2 - Task is written to work tape for generation. 3 - Task is not written to work tape (bypassed).
TSKGN	B40901	XXXXX	Task (XXXXX) Parameters contain invalid fields.	Type: 0 - Terminate Process. 1 - Correct Parameters and re-insert. TSKGN will start over. 2 - Task is written to work tape for generation. 3 - Task is not written to work tape (bypassed).
TSKGN	B40904		Commencing validation of work tape for parity and block count.	None.
TSKGN	B40905		Work tape block count does not validate.	Type: 0 - Terminate TSKGN. 1 - Start TSKGN Again.
TSKGN	B40910		E/F written to work tape (after BTC) in segment 1 cannot be sensed in segment 2 (merge).	Type: 0 - Terminate Process. 1 - Start merge again. 2 - Continue processing. First block on work tape will not be merged.
TSKGN	B40911		Input MLT has BTL but no E/F.	None.

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
TSKGN	B40912		Input MLT first block is EF/ED.	None.
TSKGN	B40913		Input MLT has no BTL or E/F.	None.
TSKGN	B49014	XXXXXX	Task (XXXXXX) on work tape is on input MLT as a process.	None. Task on work tape is dropped.
TSKGN	B40915		Output MLT block count does not validate.	Type: 0 - Terminate process. 1 - Restart segment 2 (merge).
TSKGN	B40916	XXXXXXXX YYYYYYY	Input MLT ETL counter (XXXXXXXX) is unequal to HSM counter (YYYYYYY).	None.
TSKGN	B40977	_OX_YY	Abnormal device termination. X = device YY=C-D characters (see page II-4 of Realcom Operating System Manual for description).	Terminate process.
TSKGN	B40999	END OF RUN	Process terminated.	None.

7. Print Error Codes (Codes will be printed on the same line as the error parameter.)

ERROR CODE	MEANING	ACTION
*E01	Task ID is not alphanumeric (Columns 1-5)	All fields are processed as if valid. Option to drop or keep a task is provided. (See B40900, and B40901 error messages.)
*E02	Start Process ID is not alphanumeric. (Columns 20-24)	
*E03	"PROCES" parameter, relative process number, is not numeric. (Columns 1-2)	
*E04	"PROCES" parameter, process ID is not alphanumeric. (Columns 20-24)	
*E05	"PREXIT" parameter exit # is not numeric. (Columns 13-14)	
*E06	"PREXIT" parameter, process destination, is not numeric. (Cols. 20-21)	
*E07	"PREXIT" parameter, alternate entrance, is not numeric. (Cols. 26-31)	
*E08	"LABDIS/DEWDIS" segment fields are not alphanumeric.	
IGN*01	Task description block exceeds 4001 characters. Task description is effectively too large.	IGN Prefix signifies parameter is ignored. Option to drop or keep a task is provided. (See B40900 and B40901 error messages.)
IGN*02	Task ID is equal to, or less than, the previous task ID. All parameters related to the task are ignored.	

7. Print Error Codes (Cont'd)

ERROR CODE	MEANING	ACTION
IGN*03	Contiguous "PROCES" parameters were processed without other intervening task description parameters.	IGN Prefix signifies parameter is ignored. Option to drop or keep a Task is provided. (See B40900 and B40901 error messages.)
IGN*04	"PROCES" parameter relative process number (Columns 1-2) is not greater than the previous number.	
IGN*05	"PREXIT" Parameter was directly preceded by a "STARTT" parameter.	
IGN*06	"PREXIT" parameter relative process number is not equal to the preceding "PROCES" relative process number.	
IGN*07	"DEVDIS/LABDIS" parameter is out of order.	
IGN*08	"DEVDIS/LABDIS" parameter process exit number is not equal to preceding "PREXIT" parameter process exit number.	
IGN*09	"DEVDIS/LABDIS" parameter process exit number is not equal to preceding "PREXIT" parameter process exit number.	
IGN*10	Invalid task description parameter.	

TAPE TO PRINTER/PUNCH (TPP01)

1. Function

This routine will print or punch output from magnetic tape that has been produced by the RCA 3301 FCP or 3301 FORTRAN.

2. Specifications

(A)

Refer to 3301 Service Routine Library (94-30-002).

- a. Format of data complies with the "3301 Standards for Organization of Data on Magnetic Tapes."
- b. Data blocks may be batched or unbatched as follows:
 - 1) FORTRAN print records, ~~FORTRAN~~ punch records, and variable-length records must always be unbatched.
 - 2) When records are batched, all records in a given file must be same size.
 - 3) Maximum block size is 5,000 characters.
- c. FORTRAN print records will contain a leading character that is disregarded when printed.
- d. Minimum size record is four characters, maximum size record is 300 characters including four-character appendage.
- e. Single or multifiles may be processed.
- f. If multifiles are being processed, it is possible to select by file labels. If the multifile option is not used, the file will be processed and a message will be issued to the typewriter for further action.
- g. If the tape contains rerun ~~amps~~ created by the Operating System, the dump will be bypassed.
- h. COBOL source programs can be edited with a "COBOL" parameter. (See page IV-112.
- i. The routine will allow automatic tape swapping of unlabeled tapes when such has been indicated at object time by assigning two tape trunks to the same device. The input tape just completed will be rewound and the routine will continue processing the alternate tape trunk.

(A)

(A)

3. Device Assignments

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01, 02	_IP_TAPE	01	01
50	_OP_PRNT	01	02
44	_OP_PNCH	01	03
40	OIP_PRAM	01	04

4. Process ID - TPP01

5. Parameters: may be inserted by way of the Console Typewriter, or the card reader (optional). The format is outlined on the following page.

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Parameters (Cont'd)

PRINT

- A. This parameter must be entered to describe the type of input to be printed and/or punched.

Card Column	1-5	6	7,8,9	10-12	13	14	15	16	17-24	25-30	31-41	42-80
Legend	PRINT	S P A C E	[X,Y]	S P A C E S	[R]	[C]	[M]	[A P SP]	[NNNNNNNN]	[MMDDYY]	*FORTRAN [BBBBBGGGRRR]	Spaces

- B. Print Statement for Edited input:

ColumnsDescription

- 1-5 - Print - mandatory.
- 6 - Space.
- 7-9 - X = the first input tape; y = the second input tape. If tape swapping is not desired, these columns may be spaces.
- 10-12 - Spaces.
- 13 - R - indicates rewind input at beginning of run.
- 14 - C - indicates that the tape is not to be rewound at the end of print run, otherwise tape will be rewound.
- 15 - M - indicates input is a multifile reel, if space, single file is assumed.
- 16 - A - print all (data, labels, E/F's, and E/D's).
P - print data and labels only.
Space - print data only.
- 17-24 - Eight-character file identification (optional).
- 25-30 - Six-character file creation date (optional).
- 31-41 - FORTRAN or batched input information as follows:
- FORTRAN in columns 31-37 informs the routine that the input was produced by "3301 FORTRAN" (optional).
- BBBBB in columns 31-35 represents the five-character numeral batch size (optional).
- GGG in columns 36-38 is equal to number of records per batch. If this is not present, 001 and unbatched records are assumed.

*If this item is omitted, unbatched records are assumed.

Parameters (Cont'd)

<u>Columns</u>	<u>Description</u>
31-41 (Cont'd)	- RRR - in columns 39-41 represents the record size including the four-character appendage. If this is not present, 130 characters are assumed.
42-80	- Spaces.

Note: If a multifile reel is to be processed and the file identification parameter is not given, the files on that tape will be handled individually (a halt will occur at the end of each file - "B30402") and in their respective sequence.

COBOL - Print of COBOL source program:

CARD COLUMN	1 - 5	6 - 41	42 - 71	72-80
Legend	PRINT	Spaces	SSSS — SSSS	Spaces

Card Columns

1-5 - PRINT-mandatory.

6-41 - Spaces.

42-71 - Heading to be printed on each page of listing - mandatory.

72-80 - Spaces.

CARD COLUMN	1-4	5-80
LEGEND	STOP	Spaces

©

STOP - terminate process.

Columns 1-4 - STOP

6. Timeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
TPP01	B30401	ENTER_PARAMETER	Parameters are to be entered by way of the Console Typewriter.	Type in parameter. Refer to step 5 for parameter format.
TPP01	B30402		One file of a multi-file reel has been processed.	Type in one of the following: 0 to terminate process 1 to rewind input tape and read new parameter. 2 to process next file.
TPP01	B30403		Batch size on parameter does not equal number of records in batch times the record size.	Respond with one of the following: 0 to terminate the process 1 to read a new parameter 2 to assume RRRXGCC
TPP01	B30404	XXXXXXXX	Parameter is not PRINT or STOP. X....X represents parameter.	Respond with one of the following: 0 to terminate the process 1 to read a new parameter.
TPP01	B30405	XXX	Short record on tape. The message XXX is too short to be processed.	Record bypassed and continues to process next record.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
TPP01	B30406		Input record indicates load of print table but table is less than 64 characters.	Respond with one of the following: 0 to terminate process 2 to continue with previous print table, bypass this record.
TPP01	B30407	XXXXXXXX	Label XX...XX requested in parameter not present.	} Respond with one of the following: 0 to terminate process 1 to read new parameter.
TPP01	B30408		Batch size exceeds 5000 characters.	
TPP01	B30410		Swap Device failed.	Respond with one of the following: 0 to terminate process. 1 to read new parameter.
TPP01	B30411		1. File format error. 2. Parameter format error.	Respond with one of the following: 0 to terminate process 2 to read next record and continue. (A)
TPP01	B30412		The batch is either too large or smaller than specified in parameter but not by an even multiple of RRR.	Respond with one of the following: 0 to terminate process 2 to continue
TPP01	B30413		Record not 80 characters in length in COBOL file.	None. Process continues.
TPP01	B30414		File format error in COBOL file.	Respond with one of the following: 0 to terminate process 2 to continue.
TPP01	B30415		Bad read of record.	Respond with one of the following: 0 to terminate process 2 to continue. Record will be bypassed.
TPP01	B30416		Not specified length.	None. Process is terminated.

(Cont'd)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
TPP01	B30477		Abnormal termination.	None. Process is terminated.
TPP01	B30488	INV_REPLY	Invalid reply to previous message	Type in correct reply.
TPP01	B30499	END_OF_RUN	Self-explanatory.	None. Process is terminated.

TAPE FILE MAINTENANCE (MAINT)

1. Function

This routine provides the ability of maintaining normal data files and program files. It maintains Assembly source programs and COBOL source programs. Also provided are testing routines. For a complete description of Tape File Maintenance functions refer to the Service Routine Library manual (94-30-002).

2. Specifications

Refer to Service Routine Library manual (94-30-002).

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seq. No.</u>	<u>Seq. No.</u>
40	_IP_PARM	02	05
21	_LOGI_0A	99	0A
22	_LOGI_0B	99	0B
40	_IP_CARD	99	0-
50	_PRINTER	99	0Q

The preassigned device characters A, B, -, and Q (above) have been arbitrarily called "t" characters. If the "t" character in any parameter will be other than A, B, -, or Q, or it is desired to assign additional devices to this routine, then DEVPAR's must be entered when "ENTER PROCESS PARAMETERS" is typed out on the Console Typewriter. One DEVPAR must be entered for each additional device. The first four characters must be as follows:

<u>Seq. No.</u>	<u>Seq. No.</u>
99	0X

where X equals the "t" character (device) to be used in the parameter.

Refer to the Realcom Operating System Manual (94-08-000) for DEVPAR

The last DEVPAR must be followed by an "E/D" card. After the "02" is typed in, all assignments are typed on the Console Typewriter.

Make appropriate changes (if necessary) at this point and verify the validity of the "t" characters assigned (maximum of 12).

When the REPE function is to be used and the number of repeated functions exceed "05", the following DEVPAR is required:

"0204 _DEVPAR _ _ _ _ _ C L , 1 _ / 02 / _REPE_TP"

The following assignment should be changed:

"0205_L40_AD40_CRDR_2_ _ _ IP_PARM"

This assignment should be changed to "NONE" if parameters are to be entered by way of the Console Typewriter. If parameters are to be entered by way of a device other than the Console Typewriter or card reader, the appropriate change must be made.

4. Process ID - MAINT

5. Parameters

Refer to Service Routine Library manual (94-30-002)

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20101	ABNRM TERM DEVICE OX. C - D CHARS XX.	Abnormal termination on input or output device.	Type in: 1 to accept parameter from normal param- eter input device. 2 to type correct parameter. 3 to terminate process. 5 to accept next param- eter from Console Typewriter. 6 to accept next param- eter from normal parameter input de- vices. OX to access operating routines; upon their completion, resume processing thru the option specified by the "X" character. 4X to terminate the re- peat function and re- sume processing thru the option specified by the "X" character. "X" may be 1,2,3,5, or 6. 7 to go back to Issue. 8 to continue as if it was a normal termi- nation.
MAINT	B20102		File format error	None.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20103		Parameter key error- Reference key for Delete correction was not found on source input.	Next correction is read and processing is continued.
MAINT	B20104		Source sequence error-source input failed sequence check.	Source is accepted and processing continues.
MAINT	B20105		No BTL on t_1	None.
MAINT	B20106		No E/F after BTL on t_1	None.
MAINT	B20107		Correction sequence error - correction failed sequence check	Correction is accepted and processing con- tinues.
MAINT	B20108		Label not found.	None.
MAINT	B20109		T_1 label parameter not equal to "PROC. LIB" "ENVY_LIB", or "DATA_LIB"	None.
MAINT	B20110		T_1 label parameter requested not on t_1 Input	None.
MAINT	B20111		T_5 label parameter requested not on t_5	None.
MAINT	B20112		Invalid Correction Header	Type in: 7 to read next param- eter from t_3 device. 8 to go to End of Job 9 to read next param- eter from the type- writer.
MAINT	B20113		Library routine to be deleted not lo- cated on t_1 .	Type in: 7 to read next param- eter from t_3 device. 8 to read next param- eter from the type- writer.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

PREFIX	MESSAGE		MEANING	ACTION
	CODE	VARIABLE DATA		
MAINT	B20114		Library routine to be replaced not located on t_1 .	Type in: 7 to read next parameter from t_3 , device. 8 to add instead. 9 to read next parameter from the type-writer.
MAINT	B20115		Library routine to be added already on t_1 .	Type in: 7 to read next parameter from t_3 device. 8 to replace instead. 9 to read next parameter from the type-writer.
MAINT	B20116		Library routine to be extracted already on input.	Type in: 7 to read next parameter from t_3 device. 8 to replace instead. 9 to read next parameter from the type-writer.
MAINT	B20117		Library routine to be corrected not on input.	Type in: 7 to read next parameter from t_3 device. 9 to read next parameter from the type-writer.
MAINT	B20118		Used when t_3 is type-writer to request next parameter.	Type next parameter.
MAINT	B20119		Previous correction sequence number is equal or less than current.	Type in: 7 to read next parameter from t_3 device. 8 to read t_3 device and ignore corrections until next library name parameter is read. 9 to read next parameter from the type-writer.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20120	<u>CURRENT PARA</u> <u>PREVIOUS PARA</u>	Library name parameter is equal to or less than previous.	Type in: 7 to read next parameter from t ₃ device. 8 to read t ₃ device and ignore corrections until next library name parameter is read. 9 to read next parameter from the typewriter.
MAINT	B20121		T ₃ parameter contains a "D", "C", or "R" in column 7 but t ₁ parameter contained a Ø (zero).	None.
MAINT	B20122		Extract requested but E/D encountered on t ₅ before locating routine to be extracted.	None.
MAINT	B20123		Extract parameter, format nnnnnn_ thru n ₁ n ₁ n ₁ n ₁ n ₁ n ₁ is invalid or missing.	Type in: 7 to read t ₃ device and ignore corrections until next library name parameter is read. 8 to read correction parameter from the typewriter.
MAINT	B20124		Response to "8" typed in for Error B20123	Type in correction.
MAINT	B20125		Illogical program error stop column 7 in parameter tested less than a "D" but greater than a "C".	None.
MAINT	B20126		Illogical program error stop column 7 in parameter tested less than a "D" but greater than an "E".	None.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20127		Illogical program error stop column 7 in parameter tested less than a "D" but greater than an "E".	None.
MAINT	B20127		T ₁ out of sequence (less than previous)	None.
MAINT	B20128		T ₁ contains duplicate library routines	None.
MAINT	B20129		Program illogical stop. Block size read from t ₅ is not a multiple of 80 characters.	None.
MAINT	B20131		Program Illogical stop. Output batch being created for t ₂ is greater than 800 characters.	None.
MAINT	B20133		No ETL.	None.
MAINT	B20134		File format error.	None. Routine will write E/D to output tape and read next parameter.
MAINT	B20135		Program illogical stop. After reading a t ₁ batch and finding the first record to be the library name, the read t ₁ routine signals the first record to be an E/F.	None.
MAINT	B20139		First parameter following COBOL.	Type in: 1 or 6 to accept correct COBOL parameter from normal input devices.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20139 (Cont'd)			2 or 5 to type in correct COBOL parameter from normal input devices. 3 to terminate process. 7 to accept next non-COBOL parameter from Console Typewriter. 8 to accept next non-COBOL parameter from normal input device. OX to access operating routines; upon their completion, resume processing through the option specified by the X characters. 4X to terminate the repeat function and resume processing through the option specified by the X character. Note: X may be 1,2, 3,5, or 6 but not 7 or 8.
MAINT	B20136		Program illogical stop. After reading at t_1 batch and finding the first record to be the library name, the next record requested is signaled as an E/F. All corrections are added and processing continues.	None.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20138		Missing ISS	None. Routine will write bad message and read next input message.
MAINT	B20201		No beginning label on t_1 .	Writes "NO_LABEL" as file ID on output tape.
MAINT	B20202		E/D was read on t_1 before desired file ID was located during search.	Type in: 1 to accept parameter from normal parameter device. 2 to type correct parameter. 3 to terminate process. 5 to accept next parameter from the Console Typewriter. 6 to accept next parameter from normal parameter input devices. OX to access operating routines; upon their completion, resume processing thru the option specified by the "X" character. 4X to terminate the repeat function and resume processing thru the option specified by the "X" character. "X" may be 1,2,3,5, or 6. 7 the correct t_1 must be mounted before replying with "7". Program will rewind t_1, if magnetic tape and search for same file ID.

(Continued)

6. Timeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20203		First character is not an ISS.	Message in error is not processed.
MAINT	B20204		Too many characters in a field.	Message in error is not processed.
MAINT	B20205		Wrong number of ISS's.	
MAINT	B20206	REF KEY OF CORRECTION IN ERROR IS XXXXXXXX	Reference key of first statement to be deleted was not found.	None.
MAINT	B20207	REF KEY OF CORRECTION IN ERROR IS XXXXXXXX	Reference key of last statement to be deleted was not found.	The routine will read the next correction.
MAINT	B20208	LAST SOURCE REF KEY READ WAS XXXXXXXX	Source reference key is spaces.	Source statement is not processed.
MAINT	B20209	ABNORMAL TERMINATION ON DEVICE OX. C-D CHARACTERS ARE XX.		Type in: 1 to accept parameter from normal parameter input device. 2 to type correct parameter. 3 to terminate process. 5 to accept next parameter from the Console Typewriter. 6 to accept next parameter from the normal parameter input devices. OX to access operating routines; upon their completion, resume processing thru the option specified by the "X" character. 4X to terminate the repeat function and resume processing thru the option specified by the "X" character.

(Continued)

6. Typewriters - Normal and Error (Cont'd)

PREFIX	MESSAGE		MEANING	ACTION
	CODE	VARIABLE DATA		
MAINT	B20209 (Cont'd)			"X" may be 1,2,3,5, or 6. 7 to reissue the command. 8 to continue as if termination were normal. 9 (EDIT function only) If abnormal termination is on t₃ device, the format - error message will be typed to the Console Typewriter.
MAINT	B20210	LAST CORRECTION REF KEY READ WAS XXXXXXXX	Correction reference key is spaces.	Correction statement is not processed.
MAINT	B20211	SOURCE REF KEY OUT OF SEQUENCE IS XXXXXXX	Reference key of statement being processed is less than reference key of previous correction.	Source statement is processed.
MAINT	B20212	CORRECTION REF KEY OUT OF SEQUENCE IS XXXXXXX	Reference key of correction being processed is less than reference key of previous correction.	Correction is processed.
MAINT	B20213	INVALID PARAMETER	First parameter following ASSE parameter is not an Assembly function parameter.	Type in: 1 to accept parameter from normal parameter device. 2 to type correct parameter. 3 to terminate process. 5 to accept next parameter from the Console Typewriter. 6 to accept next parameter from the normal parameter input devices.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20213 (Cont'd)			OX to access operating routines; upon their completion, resume processing thru the option specified by the "X" character. 4X to terminate the repeat function and resume processing thru the option specified by the "X" character. "X" may be 1,2,3,5 or 6.
MAINT	B20214	REF KEY OF CORRECTION IN ERROR IS XXXXXXXX	E/F was read on t_1 before reference key of first statement to be deleted was found.	No more corrections are applied.
MAINT	B20215	REF KEY OF CORRECTION IN ERROR IS XXXXXXXX	E/F was read on t_1 before reference key of last statement to be deleted was found.	No more corrections are applied.
MAINT	B20216		Beginning label and/or E/F not present on t_1 .	When t_1 is magnetic tape, depress RELEASE. If t_1 is other than magnetic tape, manually back up one message and depress RELEASE.
MAINT	B20217		Beginning label and/or E/F not present on t_2 .	When t_2 is magnetic tape, depress RELEASE. If t_2 is other than magnetic tape, manually back up one message and depress RELEASE.
MAINT	B20218	INVALID PARAMETER	Second label missing from BATC parameter.	Type in: 1 to accept parameter from normal parameter input devices. 2 to type correct parameter. 3 to terminate process. 5 to accept next parameter from the Console Typewriter.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20218 (Cont'd)			6 to accept next parameter from the normal parameter input devices. 0X to access operating routines; upon their completion, resume processing thru the option specified by the "X" character. 4X to terminate the repeat function and resume processing thru the option specified by the "X" character. "X" may be 1,2,3,5, or 6.
MAINT	B20219	INVALID PARAMETER	BATC parameter contains more than seven labels.	Same as above.
MAINT	B20220		E/D read on t_1 before next label was found.	Same as above.
MAINT	B20221	<u>NO_EF_AFTER_</u> <u>XXXXXXXXXX_LABEL.</u>	Improper label format on t_1 .	Same as above.
MAINT	B20222	<u>FILE_XXXXXXXX</u> <u>BATCHED</u>	File has been written t_2 .	None.
MAINT	B20223		T_1 improperly positioned before start of UNBA or no START entry follows beginning label and E/F (if present).	Type in: 1 to accept parameter from normal parameter input devices. 2 to type correct parameter. 3 to terminate process 5 to accept next parameter from the Console Typewriter. 6 to accept next parameter from the normal parameter input devices.

(Continued)

6. Timeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20223 (Cont'd)			0X to access operating routines; upon their completion, resume processing thru the option specified by the "X" character. 4X to terminate the repeat function and resume processing thru the option specified by the "X" character. "X" may be 1, 2, 3, 5 or 6.
MAINT	B20224	<u>XXXXXX</u> UN-BATCHED	File has been written to t_2 .	None.
MAINT	B20228		Used when t_3 is type-writer request next parameter.	Type next parameter.
MAINT	B20229		Previous correction reference key is equal or less than current.	Type in: 7 to read next parameter from t_3 device. 8 to read t_3 device and ignore corrections until next library name parameter is read. 9 to read next parameter from the type-writer.
MAINT	B20230	<u>CURRENT PARA</u> <u>PREVIOUS PARA.</u>	Library name parameter is equal to or less than previous.	Type in: 7 to read next parameter from t_3 device. 8 to read t_3 device and ignore corrections until next library name parameter is read. 9 to read next parameter from the type-writer.
MAINT	B20231		T_3 parameter contains a "D", "C" or "R" in column 6 but t_1 parameter contained a $\emptyset$ (zero).	None.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20232		Extract requested but E/D encountered on t_5 before locating routine to be extracted	None.
MAINT	B20233		Extract parameter format nnnnnnn thru $r_1 n_1 n_1 n_1 n_1 n_1$, is invalid or missing.	Type in: 7 to read t_3 device and ignore corrections until next library name parameter is read. 8 to read correction parameter from the typewriter.
MAINT	B20234		Caused by an "8" typed in for Error B20233.	Type in correction.
MAINT	B20235		Program Illogical stop. After reading a t_1 batch and finding the first record to be the library name, the next record requested is signaled as a E/F. All corrections are added and processing continues.	None.
MAINT	B20237		T_1 label parameter requested not on t_1 input.	None.
MAINT	B20238		T_5 label parameter requested not on t_5 .	None.
MAINT	B20239		Library routine to be corrected not on input.	Type in: 7 to read next parameter from t_3 device. 9 to read next parameter from the typewriter.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

PREFIX	MESSAGE		MEANING	ACTION
	CODE	VARIABLE DATA		
MAINT	B20240		Invalid correction header.	Type in: 7 to read next parameter from t_3 device. 8 to go to End of Job. 9 to read next parameter from the typewriter.
MAINT	B20241		Library routine to be deleted not located on t_1 .	Type in: 7 to read next parameter from t_3 device. 9 to read next parameter from the typewriter.
MAINT	B20242		Library routine to be replaced not located on t_1 .	Type in: 7 to read next parameter t_3 device. 8 to add instead. 9 to read next parameter from the typewriter.
MAINT	B20243		Library routine to be added already on t_1 .	Type in: 7 to read next parameter from t_3 device. 8 to replace instead. 9 to read next parameter from the typewriter.
MAINT	B20244		Library routine to be extracted already on input.	Type in: 7 to read next parameter from t_3 device. 8 to replace instead. 9 to read next parameter from the typewriter.
MAINT	B20245		Illogical program error stop. Column 6 in parameter tested less than a "D" but greater than a "C".	None.
MAINT	B20246		Illogical program error stop. Column 6 in parameter tested greater than a "D" but less than an "E".	None.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20247		T ₁ out of sequence (less than previous)	None.
MAINT	B20248		T ₁ contains dupli- cate library rou- tines.	None.
MAINT	B20249		Program illogical stop. Block size read from t ₅ is not a multiple of 80 characters.	None.
MAINT	B20250		Program illogical stop. Block size read from t ₁ is not a multiple of 80 characters.	None.
MAINT	B20251		Program illogical stop. Output batch being created for t ₂ is greater than 800 characters.	None.
MAINT	B20253		Program illogical stop. After reading a t ₁ batch and find- ing the first record to be the library name, the read t ₁ routine signals the first record to be the library name, the read t ₁ routine signals the first record to be an E/F.	None.
MAINT	B20301	ARE PARAMETERS ENTERED VIA CONSOLE TYPE- WRITER		Type in: Y = Yes for Console Typewriter. N = No for other.
MAINT	B20302	INSERT PARAM- ETER		Type in a parameter for function de- sired.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20303	TYPE IN CORRECT PARAMETER	Previous parameter was invalid. New parameter is to be entered by way of the Console Typewriter regardless of normal parameter input device.	Type in: 1 to accept parameter from normal parameter input device.* 2 to type correct parameter.* 3 to terminate process.* 5 to accept next parameter from the Console Typewriter.* 6 to accept next parameter from the normal parameter input device. - OX to access operating routines; upon their completion, resume processing thru option specified by the "X" character. 4X to terminate the repeat function and resume processing thru option specified by the "X" character. "X" may be 1, 2, 3, 5, or 6. *Note: If these options are desired, a "CORR" parameter must be entered before further "CHAN" parameters will be accepted.
MAINT	B20304	TYPE IN OPTION CODE (s)	Previous parameter was invalid.	
MAINT	B20305	INVALID CODE.	Action taken for B20301 invalid.	

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20306	INVALID PARAMETER	Invalid option code entered for action taken for an invalid param- eter.	None.
MAINT	B20307	INVALID PARAMETER	Parameter type (cols. 1-5) in- valid.	None.
MAINT	B20308	INVALID PARAMETER	"T" character in- valid. Character must be: A, B, -, Q or any 3301 char- acter-provided it has been entered as the second character of a sequence number in the DEVPAR parameter at pro- cess initiation time.	None.
MAINT	B20309	ABNORMAL TERMINATION ON DEVICE OX, C-D CHARACTERS ARE YY.	Nonrecoverable error attempting to read a parameter from device OX.	None.
MAINT	B20401	ABNRM TERM DEVICE OX. C - D CHARS XX.	Abnormal termination on input or output device.	Type in: . 7 to go to Issue. 8 to continue as if it was a normal ter- mination. If in the Collect func- tion and an Abnormal termination is given on the input device type in: 9 to write E/F, End Tape Label, and another E/F to output and con- tinue normal pro- cessing. 1 to accept parameter from the normal parameter input de- vice.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20401 (Cont'd)			2 to type correct parameter. 3 to terminate process 5 to accept next parameter from the Console Typewriter. 6 to accept next parameter input devices. OX to access operating routines; upon their completion resume processing thru the option specified by the "X" character. 4X to terminate the repeat function and resume processing thru the option specified by the "X" character. "X" may be 1, 2, 3, 5, or 6.
MAINT	B20402		File format error-E/D was found before the third E/F of input file.	Type in: 1 = To read next Block. 0 = To Exit to Controller.
MAINT	B20403		Label not found on t_1 .	None.
MAINT	B20404		Label not found on t_3 .	None.
MAINT	B20405		File exists on t_1 .	Type in: 1 to rewind one gap on t_1 and enter a new parameter. 0 to rewind one gap on t_1 and insert file. 2 to copy t_1 to output and continue processing.
MAINT	B20406		Illegal pppp.	None.
MAINT	B20407		Illegal cc.	None.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20408		Exceeded RHE of message. (Example: Moved characters beyond RHE).	RHE is set by routine to reflect increment.
MAINT	B20409		Literals compare unequal.	Input area of Compare is also typed out.
MAINT	B20410		E/F in Input Area	Type in: 1 to read next block. 0 to read next parameter.
MAINT	B20411		Literal not found before E/D was found on the input tape.	None.
MAINT	B20412		Illegal AAAA.	None.
MAINT	B20413		Illegal BBBB.	None.
MAINT	B20414		High end of read in area exceeded by fill function.	None.
MAINT	B20416		E/D in Input Area.	Type in: 1 to read again. 0 to continue as normal.
MAINT	B20501	TAPE(S) POSITIONED.	The POSItion function has terminated.	None.
MAINT	B20502	TAPE X POSITIONED AFTER ED. LABEL ID NOT FOUND.	The POSItion function has terminated with tape positioned after the E/D and the label ID was not found.	
MAINT	B20503	INVALID PARAMETER	Invalid rewind option character. Must be a "space" or an "R".	None.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20504	INVALID PARAMETER	Character following rewind option in- valid. Must be F, R, or a comma.	None.
MAINT	B20505	INVALID PARAMETER	Character following label ID invalid or label ID is not eight characters. Character following label ID must be a space or a comma.	
MAINT	B20506	INVALID PARAMETER	A nonnumeric "nnnn" or "ssss", exceeds 4510, or label ID is not preceded with an L.	
MAINT	B20507	INVALID PARAMETER	"nnnn is not fol- lowed by BL, EF, or ED.	None.
MAINT	B20507	INVALID PARAMETER	"nnnn is not fol- lowed by BL, EF, or ED.	None.
MAINT	B20508	HALT ON IN- EQUALITY.	A block read from t ₁ is not equal to a block read from t ₂ with the halt option (H) speci- fied in the "COMP" parameter.	Type in: 1 to continue with the COMPare function. 2 to continue with the COMPare function after removing the HALT option. 3 to terminate the pro- cess. 4 to terminate the pro- cess after the tape rewinds. or a parameter for func- tion desired.
MAINT	B20509	ABNORMAL TERMINATION ON DEVICE OX. C - D CHAR- ACTERS ARE YY.	Abnormal condi- tion on an input/ output device.	Type in : 1 to accept parameter from the normal param- eter input device. 2 to type correct param- eter.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20509 (Cont'd)			3 to terminate process. 5 to accept next parameter from the Console Typewriter. 6 to accept next parameter from the normal parameter input devices. 0X to access operating routines; upon their completion, resume processing thru the option specified by the "X" character. 4X to terminate the repeat function and resume processing thru the option specified by the "X" character. "X" may be 1, 2, 3, 5, or 6. 7 to retry Issue. 8 to ignore abnormal conditions and continue process. 9 to accept next "CHAN" or "ENDC" only.
MAINT	B20510	XXX BLOCKS UNEQUAL. XXXXX BLOCKS COMPARED.	The COMPare function has terminated.	None.
MAINT	B20511	INVALID PARAMETER.	Invalid character (column 12) for tape direction. Must be "F" or "R".	None.
MAINT	B20512	XXXXX BLOCKS COPIED.	The COPY function has terminated.	None.
MAINT	B20513	ED COPIED BEFORE LABEL ID FOUND.	The label ID specified in the COPY parameter is not on tape "t ₁ ".	Type in: 1 to accept parameter from normal parameter input device. 2 to type correct parameter.

(Continued)

6. Timeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20513 (Cont'd)			3 to terminate process. 5 to accept next parameter from the Console Typewriter. 6 to accept next parameter from the normal parameter input devices. OX to access operating routines; upon their completion, resume processing thru the option specified by the "X" character. 4X to terminate the repeat function and resume processing thru the option specified by the "X" character. "X" may be 1, 2, 3, 5, or 6. 7 to retry issue. 8 to ignore abnormal condition and continue processing.
MAINT	B20514	INVALID PARAMETER.	To CHAN "nnnn" is greater than the CORR "nnnn". Attempted to change a block that is not to be copied as specified by the CORR parameter.	None.
MAINT	B20515	INVALID PARAMETER.	"cc" or "mm" not numeric.	None.
MAINT	B20516	INVALID PARAMETER.	CHAN "pppp" not numeric.	None.
MAINT	B20517	INVALID PARAMETER.	CHAN parameter not in sequence ("nnnn")	None.

(Continued)

6. Timeouts - Normal and Error (Cont'd)

PREFIX	MESSAGE		MEANING	ACTION
	CODE	VARIABLE DATA		
MAINT	B20518	INVALID PARAM- ETER.	CHAN parameter is not blank after "pppp" with "cc" equal to "00".	None.
MAINT	B20519	INVALID PARAM- ETER.	CHAN "pppp" exceeds right-hand and when shorter block size is indicated.	None.
MAINT	B20520	INVALID PARAM- ETER.	CHAN "cc" exceeds	None.
MAINT	B20521	INVALID PARAM- ETER.	CHAN "pppp" is not followed by a space or an asterisk with "cc" equal to "00".	None.
MAINT	B20522	INVALID PARAM- ETER.	CHAN "pppp" + "cc" does not exceed right-hand end when lengthen block size is indicated.	None.
MAINT	B20523	EF ED	An E/F or E/D is compared and found unequal.	None.
MAINT	B20524	COUNT EXCEEDS CORRECT PARAM- ETER COUNT.	Number of blocks copied exceeds "nnnn" of the CORR parameter.	None.
MAINT	B20525	[NOT] APPLIED. OLD LITERAL IS	Console typewriter used as the display device (t ₃ of CORR parameter) for changes applied and not applied.	None.
MAINT	B20526	XXXX BLOCKS READ. YYYY BLOCKS COPIED.	The CORRECT func- tion has terminated. XXXX minus YYYY equals number of deletes.	None.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MAINT	B20527	INVALID PARAM- ETER.	Invalid parameter type (columns 1-5. Should be a "CHAN" or "ENDC" param- eter.	None.
MAINT	B20528	INVALID PARAM- ETER.	CHAN "pppp" + "cc" exceeds RHE when lengthen block size is not indi- cated.	None.
MAINT	B20529	INVALID PARAM- ETER.	"nnnn" is 0000.	None.
MAINT	B20530	INVALID PARAM- ETER.	Repeat function requires a device for parameters to be stored and de- vice was not assigned.	Terminate process and restart. Assign a de- vice for parameters to be stored.

MLT CORRECT AND EDIT (MLTCR)

1. Function

This routine allows corrections to be made to any block on an MLT. The ability to edit an MLT completely and selectively is also provided.

2. Specification

Refer to Service Routine Library manual (94-30-002).

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01	_INPTP	01	01
02	_OUTPT	01	02
40	_IP_PA	01	03
03	_WORK	01	04
50	_OP_PR	01	05
04	_INPTS	01	15
02	_INPTE	02	09

0101 - Primary input tape

0102 - Corrected output tape

0104 - Necessary when "A" type corrections are applied

0209 - Input for the Edit function

0115 - Secondary input tape used in Merge function only.

If Edit only is desired 0101 is assigned NONE and 0209 is assigned the input.

If Merge function is desired it must be noted that a one-tape system must be merged with a one-tape system and a two-tape system must be merged with a two-tape system. In the case of equalities in merging the priority is given to the secondary input tape (0115).

4. Process ID - MLTCR

5. Parameters

Refer to Service Routine Library manual (94-30-002).

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MLTCR	B40101		Verification error, error issued to printer and correction not applied.	Respond with a: 0 to terminate process. 1 to read another parameter. 2 to read new parameter from Console Typewriter. 3 to apply without verification ☒ to transfer to PIN halt.
MLTCR	B40102		Address error, address of correction specified in parameter does not coincide with Indicator in Col. 4 of parameter.	
MLTCR	B40103		Card Format error.	
MLTCR	B40104		Illogical error.	Process is terminated.
MLTCR	B40105		Input tape not proper format. (Correct function).	Respond with a: 0 to terminate process. 1 to restart run 2 to reread input tape.
MLTCR	B40106		Card out of sequence. An address is given for block previously written to the output tape.	Respond with a: 0 to terminate process. 1 to read another parameter. 2 to read new parameter from Console Typewriter. 3 to apply without verification. ☒ to transfer to PIN halt.
MLTCR	B40107		Input tape not in proper format. (Edit function)	Respond with a: 0 to terminate process. 1 to reread input.
MLTCR	B40108		Card out of sequence ("A" type correction).	Respond with a: 0 to terminate process. 1 to read another parameter. 2 to read new parameter from Console Typewriter

(Continued)

6. Timeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MLTCR (Cont'd)	B40108			3 to apply without verification. ☐ to transfer to PIN halt.
MLTCR	B40109		Input block too large.	Respond with a: 0 to terminate process. 1 to read next parameter. 2 to read next parameter from Console Typewriter.
MLTCR	B40110		Old block size less than new block when "shorten parameter" was requested or greater than new block when "expand parameter" was requested.	Respond with a: 0 to terminate process. 1 to read next parameter. 2 to read next parameter from Console Typewriter.
MLTCR	B40111		Old block size is equal to new block size when "expand" or "shorten parameter" was requested.	Respond with a: 0 to terminate process. 1 to read next parameter. 2 to read next parameter from Console Typewriter.
MLTCR	B40115		Maximum exceeded for process: DEVPAR - 19 per process DEMPAR - 17 per process	Respond with a: 1 to read next parameter. 2 to restart ☐ to transfer to PIN halt.
MLTCR	B40116		Correction card out of sequence.	Respond with a: 1 to read next parameter. 2 to restart. ☐ to transfer to PIN halt.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MLTCR	B40117		Input tape not in proper format.	Respond with a: 2 to restart. ☐ to transfer to PIN halt.
MLTCR	B40118		Card format error while processing preassignment corrections.	Respond with a: 0 to terminate. 1 to read next parameter 2 to restart. ☐ to transfer to PIN halt.
MLTCR	B40119		Block to be corrected could not be located on tape.	Respond with a: 0 to terminate. 2 to restart. ☐ to transfer to PIN halt.
MLTCR	B40120		E/D sensed before END card read.	Respond with a: 1 to restart. ☐ to transfer to PIN halt.
MLTCR	B40121		"S" blocks exceed maximum of 18.* *Any "A" type correction after 18 blocks have been corrected will not be applied.	Respond with a: 0 to terminate. 1 to read next card* ☐ to transfer to PIN halt.
MLTCR	B40123		Nonlegitimate expansion* *Accepted only if correction is in proper area.	Respond with a: 1 to read next card. 2 to skip expansion* ☐ to transfer to PIN halt.
MLTCR	B40124		ID of "S" block not found.	Respond with a: 0 to terminate process. 1 to read next parameter. 2 to read next parameter from Console Typewriter.

(Continued)

6. Timeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
MLTCR	B40130		Patch LSC greater than object coding LSC.	Informative warning. No action.
MLTCR	B40131		Patch MSC less than object coding MSC.	Informative warning. No action.
MLTCR	B40151		Delete messages exceed maximum of 15.	Respond with a: 0 to terminate. 1 to read next parameter. 2 to restart.
MLTCR	B40152		Delete message out of sequence.	Respond with a: 0 to terminate. 1 to read next parameter. 2 to restart.
MLTCR	B40160		E/D found before END card was read.	Process terminates.
MLTCR	B40177		Abnormal Termination. Process out of alpha/numeric order. MLT input not in proper format. Read errors from input tape.	Correct and reinitiate routine.
MLTCR	B40188	_INV_REPLY	Response to previous error invalid.	Issue correct response to previous message.
MLTCR	B40198		Process cannot be found on the input.	Correct and reinitiate routine.
MLTCR	B40199	_END_OF_RUN		None.

PROCESS/TASK EXTRACT (PTEXT)

1. Function

This routine selects tasks and/or processes from an MLT or a One-Tape System and creates an output composed of the selected tasks and/or processes.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

(A)

- a. The input must be either an MLT or a One-Tape System.
- b. The output contains only the selected processes or tasks requested in same format of the input.
- c. If the input is a One-Tape System the routine will copy the operating system and will duplicate the frequently used overlays to the output following every second Process which is extracted. Compatibility overlays, if present, will be duplicated at the end of the output.
- d. Parameters need not be in ascending order. The routine does an internal sort on ID's.
- e. Extracted Processes or Tasks are listed on the On-Line Printer.

The listing contains:

1. ID's of all Processes extracted.
2. ID's of all Tasks extracted.
3. ID's of all Processes which constitute each extracted Task (though these Processes need not be present on the input and, consequently, will not appear on the output tape).

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01	Input	01	01
02	Output	01	02
50	Listing	01	03
40	Param	01	04
03	Work	01	05

0104 - If parameters are to be entered via the Console Typewriter this entry should be 0104 - NONE.

0105 - If input is a One-Tape System this tape must be assigned. It is used to store frequently used overlay segments. If input is an MLT this assignment may be NONE.

4. Process ID - PTEXT

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5. Parameters

a. Process or Task parameter

Position	1	2	3 - 7	8 → 80
Content	Process or Task Indicator	Space	Process or Task ID	Not Used

Column

Content

1	P - indicates Process to be extracted. T - indicates Task to be extracted.
2	Space
3-7	Process or Task ID
8-80	Not used.

One parameter for each Process or Task is mandatory.

b. Termination Parameter

1-4	5	6	7	8-80
STOP	Output Rewind Indicator	Input Rewind Indicator	Parameter Rewind Indicator	Not Used

Column

Content

1-4	STOP - mandatory
5	Space - rewind output tape. N - do not rewind output tape.
6	Space - rewind input tape N - do not rewind input tape.
7	Space - rewind parameter tape N - do not rewind parameter tape.
8-80	Not used.

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PTEXT	B41001	INSERT PARAMETER	Parameter is to be entered via the Console Typewriter.	Type in parameter and depress RELEASE.
PTEXT	B41002	_Y_XXXXX	Process or Task ID (XXXXX) entered as a parameter contains a nonalphanumeric character.	Respond with a: 0 to terminate process 1 to enter correct parameter via the Console Typewriter. 2 to ignore parameter and read next parameter from normal device.
PTEXT	B41004	_Y_XXXXX	Process or Task Indicator Y is neither a "P" nor "T" in parameter with name XXXXX.	
PTEXT	B41005	_Y_XXXXX	Process or Task ID (XXXXX) entered as a parameter, or Process ID (XXXXX) which is part of a Task being extracted, is not on input.	None. ID XXXXX is ignored and processing continues.
PTEXT	B41006		Illogical condition.	Process terminates.
PTEXT	B41007		No E/F after beginning tape label on input. Format error.	Process terminates.
PTEXT	B41008		Number of ID's to be processed exceeds maximum of 450.	Process terminates.
PTEXT	B41010	_WORK_DEVICE_NOT_ASSIGNED	A One-Tape System is being processed, but NONE was assigned to WORK at Device Assignment time.	Follow operating procedures to succeeding typeouts in order to assign WORK device.
PTEXT	B41011	_T_XXXXX	XXXXX is a Process on the input, not a Task as indicated in parameter.	Type in: 0 to terminate 2 to ignore XXXXX and continue 3 to extract XXXXX as a Process rather than a Task.

(Continued)

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
PTEXT	B41012	_P_XXXXX	XXXXX is a Task on the input, not a Process as indicated in the parameter.	XXXXX is ignored and processing continues.
PTEXT	B41013		Number of ID's in listing table exceeds maximum of 540.	Process terminates.
PTEXT	B41077		Abnormal termination on device as indicated by previous message.	Process terminates.
PTEXT	B41088	_INV_REPLY	Reply to previous message was invalid.	Respond with valid action.
PTEXT	B41099	_END_OF_RUN	Routine terminated.	None.

3301 MLT-301 Program Copy Routine (AD301)

1. Function

This routine combines a 3301 MLT and a 301 program library tape to be used with the 3301 Operating System.

2. Specifications

Refer to 3301 Service Routine Library (94-30-002).

Ⓐ

a. Input may be one of the following:

- 1) 301 Program tape (need not be standard PLT)
- 2) 3301 MLT
- 3) 3301 One-Tape Operating System tape

b. Positioning will be performed on the 3301 MLT or One-Tape System to the end of the 3301 portion of the tape if it is not to be copied.

c. Copy the 3301 MLT or One-Tape System to the end of the 3301 portion of the tape if it is to be copied.

d. Copy the 301 program tape behind the 3301 portion of the tape to create a combined 3301-301 operating MLT.

e. The AD301 routine requests all available memory. This is necessary to ensure enough memory to copy the maximum size block that may exist on the 301 program tape.

f. The 301 program tape need not be a standard PLT, but there must not be any E/F's or E/D's present on the tape except at the end.

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01	Input	01	01
02	Output	01	02
03	OPT_INP	01	04

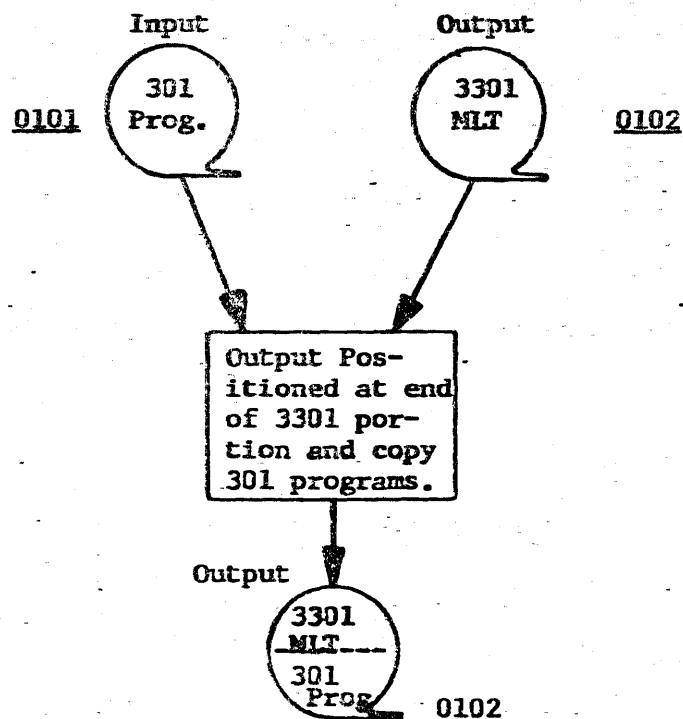
4. Process ID AD301

5. Parameters - None

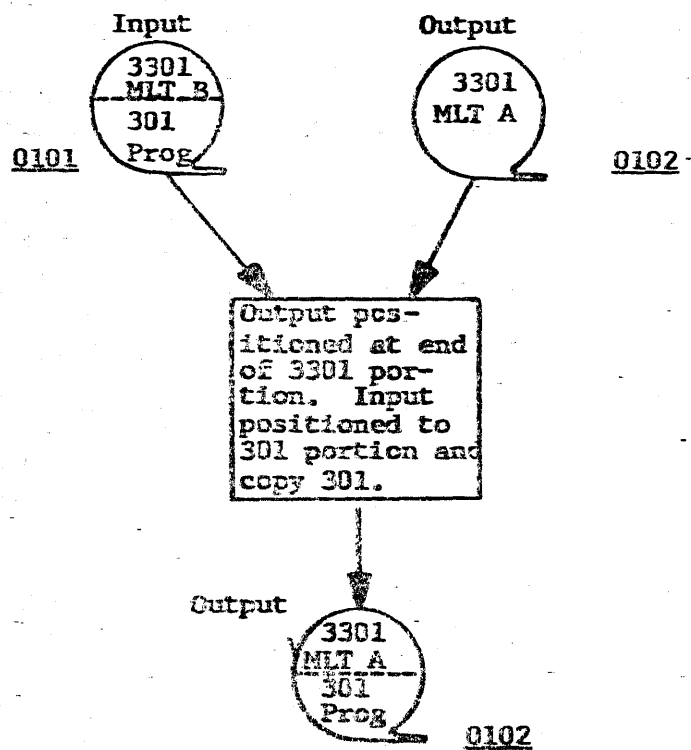
See various options on following illustrations.

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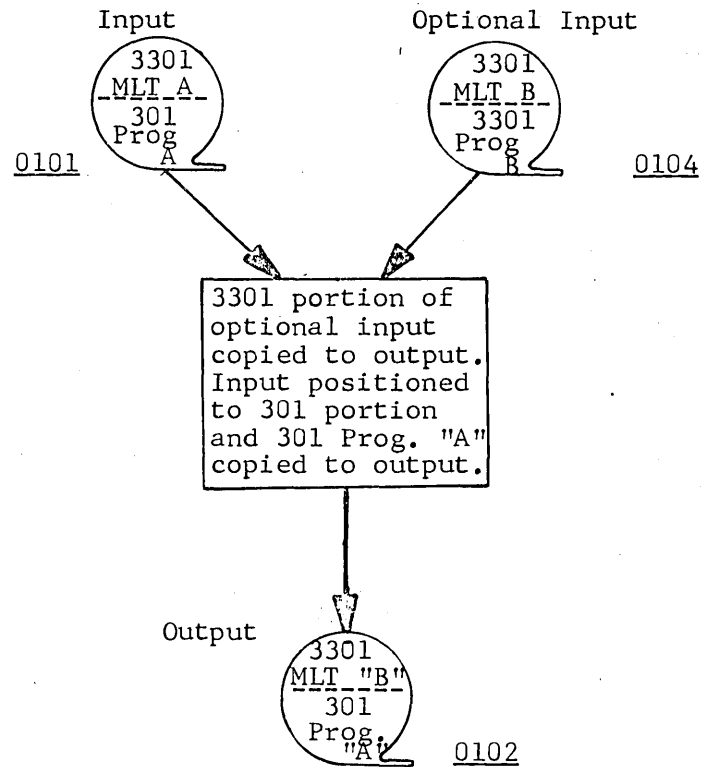
Option 1



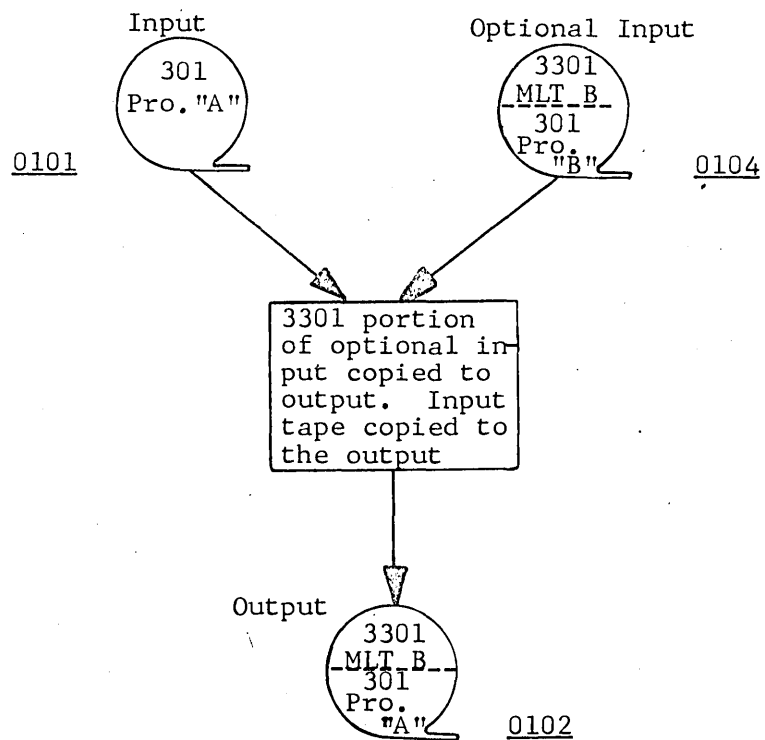
Option 2



Option 3



Option 4



6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
AD301	B49902		E/D read before a block starting with S M M 0000000 on optional input.	None. Process will continue and S M M 0000000 block is written on output.
AD301	B49903		Beginning tape label is not first block on optional input.	None. A label and E/F are written on output tape. Optional input rewound to BTC, run continues.
AD301	B49904		No E/F after BTL (if present) on optional input. Tape is out of format.	None. Process terminates.
AD301	B49905		Abnormal device termination while rewinding optional input after it has been copied.	Rewind manually. Process will continue.
AD301	B49906		BTC reached before S M M 0000000 while reading output tape in reverse.	None. Process terminates.
AD301	B49907		A block starting with S M M 00000000 was read on 301 tape. The tape is out of format.	None. Process terminates.
AD301	B49908		Abnormal termination while writing a BTL or E/F after BTL on output tape.	None. Process terminates.
AD301	B49909		E/D read on output before a block starting with S M M 00000000. Tape is out of format.	None. Process terminates.
AD301	B49910		A block greater than 4000 was read on the optional input tape.	None. Process terminates.

6. Typeouts - Normal and Error (Cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
AD301	B49911		An E/D was read on a combined 3301/301 tape before a block starting with S 11 00000000. Tape is out of format.	None. Process terminates.
AD301	B49912		No S 11 00000000 block was read on the optional input.	None. Optional tape is rewound and an S 11 00000000 block is written to output tape. Process continues.
AD301	B49913		E/F was read on the 301 tape before E/D. Tape is out of format.	None. An E/D is written to the output tape. Input 301 and output are rewound.
AD301	B49999	END_OF_RUN	Normal END OF RUN	None.

CALCULATE DRUM SPACE (LCSSR)

1. Function

The Calculate Drum Space routine copies an entire MLT calculating every process or selected processes for amount of drum space required for transcription to the drum.

2. Specification

A) Refer to 3301 Service Routine Library (94-30-002).

- a. Input may be either a regular MLT or a One-Tape System.
- b. Output produced will be the same as the input (that is MLT input will produce an MLT output and a One-Tape System input will produce a One-Tape System Output).
- c. Parameters to specify the selected process(es), or all processes.

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01	_IP_TAPE	01	01
02	_OP_TAPE	01	02
50	OOP_PRNT	01	03
40	OIP_PRAM	01	04

0104 - If parameters are to be entered via the Console Typewriter this entry should be 0104_NONE.

4. Process ID - LCSSR

5. Parameters

a. Selective Process Parameter

XXXXX { , }
 { - }

XXXXX = Process ID

- = indicates another parameter is to follow.
- , = indicates process ID follows.

Maximum of 13 Process ID's per parameter is permitted.

Process ID's must appear in the same sequence as they appear on the input MLT.

b. Calculate entire MLT

ALL

c. Termination Parameter

STOP

must appear as an independent parameter.

6. Timeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
LCSSR	B50101	INSERT_PARAMETER	Request parameter from Console Typewriter.	Insert parameter see Step 5.
LCSSR	B50102	XXXXX_NOT_FOUND	Process requested not present on MLT. XXXXX = Process ID.	None. Process terminates.
LCSSR	B50103	XXXXX_NOT_CALCULATED	Error detected in calculating the process. Refer to Process Transcribe run for previous errors. XXXXX = Process ID.	None. Process terminates.
LCSSR	B50177		Abnormal termination due to response to error recovery message.	None. Process terminates.
LCSSR	B50177	DO_YOU_WISH_TO_CONTINUE	Nonrecoverable error detected from printer. Option to continue without printer output is available.	Respond with a: 0 to terminate 2 to continue but without printer output.
LCSSR	B50199	END_OF_RUN	Calculation complete.	None.

PROCESS TRANSCRIBER (LPTSR)

1. Function

This routine places calculated process(es) on the drum.

2. Specification

Ⓐ Refer to 3301 Service Routine Library (94-30-002).

- a. The operating system must be running from the Drum.
- b. Input MLT must be the output of the Calculate Drum Space routine.
- c. Entire processes may be transcribed, or all segments except the first segment of a multisegment process.
- d. User has an option to designate the drum area for the process, or to have the drum area for the process automatically selected.
- e. One parameter per process but need not be in the same sequence as they appear on the MLT.
- f. No two processes may contain the same Process ID.

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
01	OIP_TAPE	01	01
52	_OP_DRUM	01	02
40	OIP_PRAM	01	03
50	OOP_PRNT	01	04

0103 - If parameters are to be entered via Console Typewriter, this entry should be 0103_NONE.

0101 - If it is desired to transcribe the process(es) directly from the running MLT, this entry should be 0101_NONE.

4. Process ID - LPTSR

5. Parameters

- a. XXXXXIYYYY - Transcription parameter.

XXXXX = five-character Process ID.

I = first segment transcription option: a space indicates all segments to be transcribed; any nonspace character indicates to transcribe all segments except the first.

YYYY = four-digit sector number to begin transcription on the drum.
If this field is spaces automatic allocation is performed.

- b. STOP - terminate transcription.

6. Typeouts - Normal and Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
LPTSR	B50301	INSERT_PARAMETER	Insert parameter via Console Typewriter.	Refer to step 5.
LPTSR	B50302	DRUM_INDEX_NOT_PRESENT	Drum index not present or it has been destroyed.	Process terminates. Restore Drum index and restart process.
LPTSR	B50303	XXXXX_NOT_CALCULATED	Process requested has not been processed through Calculate Drum Space routine. XXXXX= Process ID.	Process terminates.
LPTSR	B50304	XXXXX_NOT_FOUND	Process requested not present on MLT. XXXXX= Process ID.	Process terminates.
LPTSR	B50305	ALLOCATION_UNSUCCESSFUL, CONTINUE	1. Process to be transcribed could not be allocated. 2. Drum index area is full.	Type in a 0 to terminate 2 to continue; at terminate, check contents of Drum Index. (A)
LPTSR	B50306	TRANSCRIPTION_FORMAT_ERROR	Incorrect format on MLT.	Process terminates.
LPTSR	B50307	OP_SYS_NOT_ON DRUM	Operating system not on Drum.	Process terminates. Place Op. sys. on drum and restart process.
LPTSR	B50377		Nonrecoverable error indicated by previous ERREC message.	Process terminates.
LPTSR	B50399	END_OF_RUN	Process terminated.	None.

DRUM TO TAPE DUMP (LDTTD)

1. Function

The Drum to Tape Dump provides the user with a fast means of dumping the contents of the drum to magnetic tape. Also provided is the ability to reload the drum by means of a bootstrap and self-loading program that has been written to the tape prior to the drum contents.

2. Specification

Ⓐ Refer to 3301 Service Routine Library (94-30-002).

- a. The drum must be in standard RCA 3301 TAPE/DRUM System format (i.e. bootstrap contained in sector 0000 and drum index starts in sector 0001).
- b. Files are dumped to tape in the order that they appear in the drum index. Unused drum areas are not dumped.
- c. Output tape will contain:
 1. A tape bootstrap
 2. E/F
 3. A reload drum program
 4. Drum bootstrap (sector 0000)
 5. Drum index
 6. Remaining contents of drum
 7. E/F, End tape label, E/F and E/D

3. Device Assignment

<u>Logical Device No.</u>	<u>File Name</u>	<u>Seg. No.</u>	<u>Seq. No.</u>
52	_IP_DRUM	01	01
01	_OP_TAPE	01	02

4. Process ID - LDTTD

5. Parameters: None

6. Typeouts - Normal and Error
Dump Portion

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
LDTTD	B50202	DRUM_INDEX_NOT_PRESENT	Drum index has been destroyed.	Process terminates. Recreate drum index before dump.
LDTTD	B50204	READ_ERROR_IN_FILE XXXXXXXX. BETWEEN_SECTORS. AAAA_AND BBBB.	A nonrecoverable read error from drum detected.	Type in a 0 to terminate 2 to continue (this will cause a "bad data" block to be dumped).
LDTTD	B50277		Nonrecoverable drum or tape error.	Process terminates.
LDTTD	B50299	END_OF_RUN	Dump completed.	None.

Reload Function

To reload the drum from the output of the Dump Drum routine:

1. Mount the Drum Dump Output Tape on any tape station.
2. Depress GEN RES then depress LOAD CONSOLE and type the following message:

4X00001000..

where X is the tape station containing Drum Dump output.
Depress RELEASE. The first block will be read into memory.

3. Depress GEN RES then depress LOAD CONSOLE and type the following message.

VOX

4. The drum will now be automatically reloaded from the contents of the tape.

After the drum is reloaded, the drum bootstrap is read and control transfers to it. If the drum operating system was stored on the drum, it will be brought into memory and the system will be initiated. If the drum operating system was not stored on the drum, the reload portion will halt. The tape operating system could then be initiated.

5. Typeouts - Normal and Error
Reload Portion

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
	B50202	DRUM_INDEX_NOT_PRESENT	Drum index cannot be recognized from tape.	Process halts. Retry reload; if error persists the tape cannot be reloaded.
	B50204	ERROR_AT_SECTOR_XXXX	Parity error detected while reading or writing the drum, starting at sector XXXX. Data may be bad for maximum of ten sectors starting at XXXX.	None. Information warning. Reload continues to end.
	B50257	DRUM_ERROR	Error detected prior to reading or writing the drum.	Process halts. Retry reload.
	B50267	TAPE_ERROR	An error detected while reading the tape.	Process halts. Retry reload.
	B50277	SYSTEM_ERROR	System error detected.	Process halts. Retry reload.
	B50289	COUNT_UNEQUAL XXXX_YYYY	Block count on reload not equal to block count on ETL. XXXX=TAPE YYYY=reload block count	Process Halts. Reload may be restarted or the tape operating may be loaded. The Drum has been loaded.
	B50299	THE DRUM IS NOW LOADED	This message is typed when label count and reload block count are equal.	None.

Inf = Alt. Sw. 4

01 - -COMPT 40

V. 301 COMPATIBILITY

1. General

- a. 301 programs are run on the RCA 3301 in the same manner as on the RCA 301.
- b. Programs may be presented on the same medium as they were on the RCA 301 (Cards, paper tape, magnetic tape).
- c. 301 compatibility does not initialize the memory for the 301 programs (i.e., Print table or sum and difference tables).
- d. Device table must be constructed each time compatibility is initiated.

2. 301 Program Operating Aids

The RCA 3301 Console routines initiate and run the 301 program desired.

- a. Initiate 301 (console routine 01).
- b. Console routine "05".
 - 1) Execute 301 instruction - 05_ONAAAABBBB
 - 2) Set 301 Register 05R_XXXX - R equals P, A, or B.

If the 05P is used to set "P" the continue "02" console routine must be used to start the 301 program in operation.
 - 3) Terminate 301 Compatibility 05STOP.
 - 4) Initiate loader, 05I, sets up dummy bootstrap and issues a card-read instruction.
 - 5) 301 register display 05REGS.

3. 301 Environment Parameters

The following parameters allow the user to alter memory size and set up device assignments.

- a. The letter "M" is the constant that specifies memory size.

FORMAT - M - $\left\{ \begin{array}{l} 10 \\ 20 \\ 40 \end{array} \right\}$

where M = constant for compatibility
 10 designates a 10K memory
 20 designates a 20K memory
 40 designates a 40K memory
 example - M-20 designating a 20 K 301 memory.

301 IOS
N char.

↓
 A 1, 011
 A 2, 021
 A 7, 500
 A C, 400

- b. The letter "A" is the constant that assigns devices.

FORMAT - An(t), ddp

where A = constant for compatibility
 n = 301 device to be assigned to a 3301 device.
 This is the 301 IOS N character
 (t) = 301 device type; if not required omit
 (t = B for Binary card read)
 (t = 5 for 335 model printer)
 , = is used for readability; must be in statement
 dd = 3301 device to be assigned
 p = priming code for 3301 device assigned

Figure in (t) is optional, enter only if necessary.

Examples

- 1) A75,500 assign 301 printer "7" type 335 to 3301 printer "Q" (50)₈
- 2) A1,01 assign 301 tape station 1 to 3301 tape station 1 (01)₈

- c. The letter "C" changes a device assignment made in error or changes device assignment for use by a subsequent 301 program, etc.

FORMAT- Cn(t), ddp

where C = constant for compatibility
 nt, ddp = these items are the same as in the ASSIGN parameter.

- d. Use the following parameters to specify print buffer loading.

1. PR1 - Load buffer once only.*
2. PR2 - Load buffer every time.

* If no parameter is entered this will be assumed.

In response to these parameters there are two informative messages confirming same if parameters are read in from a device other than the Console Typewriter:

1. "LOAD_PRINT_BUFFER_ONCE_ONLY".
2. "LOAD_PRINT_BUFFER EVERY_TIME".

PR2 parameter is necessary for 301 programs that alter the print table during operation.

- e. Use the following parameters to specify the action to be taken when a low-paper condition exists on the on-line printer.
1. LP1 - Test for page change on low paper. When a page change is detected, a halt occurs to permit replenishment of paper.
 2. LP2 - A halt occurs as soon as low paper is detected.*

If the parameters are read in from a device other than the Console Typewriter, one of the following typeouts is the response:

1. "LOW_PAPER_TEST_ON_PAGE_CHANGE"
2. "LOW_PAPER_TEST EVERY_TIME"

*If no parameter is entered, this will be assumed.

- f. To terminate parameters from any device other than the Console Typewriter the constant "END" must appear.

FORMAT - END

The 02 Console routine must be issued before processing will be continued.

Parameters may be prepared in advance on paper tape or punched cards. Parameters may also be typed on the Console Typewriter.

4. Device Substitution

The following table shows the allowable 301/3301 device type substitution.

3301 DEVICE

301 DEVICE	CARD READER	CARD PUNCH	PAPER TAPE READER	PAPER TAPE PUNCH	PRINTER	MAG- NETIC TAPE
Card Reader	X		X			X
Card Punch		X		X		X
Paper Tape Reader			X			X
Paper Tape Punch				X		X
Printer					X	X
Magnetic Tape						X

The 301 monitor printer and interrogating typewriter do not require table entries. They are assigned automatically to the Console Typewriter.

5. Operating Procedures

- Initiate the system (see Section I.A.).
- When the READY light is illuminated, issue the Initiate console routine using the following format:

01_ _ COMPT $\left\{ \begin{matrix} 10 \\ 20 \\ 40 \end{matrix} \right\} \left[\begin{matrix} \text{NNP} \end{matrix} \right]$

- Upon the typeout "MOUNT_301_ENVIRONMENT", the environment parameters may be typed or entered from an input device. If parameters are to be entered from an input device, the following message should be typed:

R_ddp or RQddp

where: R = read parameters
Q = omit informative typeouts (see Typeouts)
dd = device containing parameters
p = priming code

- After all device substitutions are made, a response of "02" is required by the operator to terminate the environment routine. At this point 301 operations may be performed with the use of the "05" console operator's routine. No further assignments may be made when the environment routine has been terminated.
- Follow typeouts and 301 operating procedures.

a. Normal

MESSAGE	MEANING	ACTION
301_BCR_ON_AAAA_BBBB_ AT_PPPP	Binary card read instruction, ON_AAAA_BBBB, was encountered at location PPPP and binary reads were not specified in environment parameters.	Terminate and re-initiate specifying binary card reads.
301_ERR_ON_AAAA_BBBB_ AT_PPPP	Illegal 301 instruction, ON_AAAA_BBBB, was encountered at location PPPP.	3301 operator routines may be used.
301_HLT_ON_AAAA_BBBB_ AT_PPPP	301 halt instruction, ON_AAAA_BBBB, was encountered at location PPPP.	3301 operator routines may be used.
301_OVF_ON_AAAA_BBBB_ AT_PPPP	301 overflow error occurred while exceeding instructions ON_AAAA_BBBB at location PPPP.	3301 operator routines may be used.

b. Error

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
COMPT	133019	X..X	Displayed parameter failed validation.	Correct and reapply.
COMPT	133021	X..X	Compatibility operator routine parameter failed validation.	Correct and reapply.
COMPT	133043	X..X	301 device code in parameter failed validation.	Correct and reapply.
COMPT	133047	X..X	301 device type code in parameter failed validation.	Correct and reapply.

b. Error (cont'd)

MESSAGE			MEANING	ACTION
PREFIX	CODE	VARIABLE DATA		
COMPT	133051	X..X	3301 device code in parameter failed validation.	Correct and reapply.
COMPT	133055	X..X	Device substitution in displayed parameter failed validation.	Correct and reapply.
COMPT	133067	X..X	No match for change requested in parameter.	Correct and reapply or use assigned parameter if 301 device code is correct.
COMPT	133071	X..X	Priming code in parameter failed validation.	Correct and reapply.
COMPT	133259		301 device table exceeded.	Terminate compatibility and re-initiate.
Ⓒ COMPT	133403	ONAAAABBBB_CD	301 normal nonrecoverable I/O error. Where ONAAAABBBB is the instruction being executed when the error occurred. CD indicates the device termination conditions.	Error may be ignored by typing 02_COMPT if 3301 device is other than the MLT.
Ⓒ COMPT	133407	ONAAAABBBB_CD	301 simo nonrecoverable I/O error. Where ONAAAABBBB is the instruction following the instruction which caused the error. CD indicates the device termination conditions.	Error may be ignored by typing 02_COMPT if 3301 device is other than the MLT.
COMPT	133423		301 compatibility nonrecoverable I/O error.	Terminate.

APPENDICES

APPENDIX A

MEMORY LOCATIONS AND ADDRESSES

Memory Location	Address	Memory Location	Address	Memory Location	Address
0000	0000	42,000	2&00	47,000	7&00
10,000	&000	42,100	2A00	47,100	7A00
11,000	A000	42,200	2B00	47,200	7B00
12,000	B000	42,300	2C00	47,300	7C00
13,000	C000	42,400	2D00	47,400	7D00
14,000	D000	42,500	2E00	47,500	7E00
15,000	E000	42,600	2F00	47,600	7F00
16,000	F000	42,700	2G00	47,700	7G00
17,000	G000	42,800	2H00	47,800	7H00
18,000	H000	42,900	2I00	47,900	7I00
19,000	I000				
		43,000	3&00	48,000	8&00
20,000	-000	43,100	3A00	48,100	8A00
21,000	J000	43,200	3B00	48,200	8B00
22,000	K000	43,300	3C00	48,300	8C00
23,000	L000	43,400	3D00	48,400	8D00
24,000	M000	43,500	3E00	48,500	8E00
25,000	N000	43,600	3F00	48,600	8F00
26,000	O000	43,700	3G00	48,700	8G00
27,000	P000	43,800	3H00	48,800	8H00
28,000	Q000	43,900	3I00	48,900	8I00
29,000	R000				
		44,000	4&00	49,000	9&00
30,000	"000	44,100	4A00	49,100	9A00
31,000	/000	44,200	4B00	49,200	9B00
32,000	S000	44,300	4C00	49,300	9C00
33,000	T000	44,400	4D00	49,400	9D00
34,000	U000	44,500	4E00	49,500	9E00
35,000	V000	44,600	4F00	49,600	9F00
36,000	W000	44,700	4G00	49,700	9G00
37,000	X000	44,800	4H00	49,800	9H00
38,000	Y000	44,900	4I00	49,900	9I00
39,000	Z000				
		45,000	5&00	50,000	&&00
40,000	0&00	45,100	5A00	50,100	&A00
40,100	0A00	45,200	5B00	50,200	&B00
40,200	0B00	45,300	5C00	50,300	&C00
40,300	0C00	45,400	5D00	50,400	&D00
40,400	0D00	45,500	5E00	50,500	&E00
40,500	0E00	45,600	5F00	50,600	&F00
40,600	0F00	45,700	5G00	50,700	&G00
40,700	0G00	45,800	5H00	50,800	&H00
40,800	0H00	45,900	5I00	50,900	&I00
40,900	0I00				
		46,000	6&00	51,000	A&00
41,000	1&00	46,100	6A00	51,100	AA00
41,100	1A00	46,200	6B00	51,200	AB00
41,200	1B00	46,300	6C00	51,300	AC00
41,300	1C00	46,400	6D00	51,400	AD00
41,400	1D00	46,500	6E00	51,500	AE00
41,500	1E00	46,600	6F00	51,600	AF00
41,600	1F00	46,700	6G00	51,700	AG00
41,700	1G00	46,800	6H00	51,800	AH00
41,800	1H00	46,900	6I00	51,900	AI00
41,900	1I00				

APPENDIX A

MEMORY LOCATIONS AND ADDRESSES (Cont'd)

Memory Location	Address	Memory Location	Address	Memory Location	Address
52,000	BA00	57,000	GA00	62,000	KA00
52,100	BA00	57,100	GA00	62,100	KA00
52,200	BE00	57,200	GE00	62,200	KB00
52,300	BC00	57,300	GC00	62,300	KC00
52,400	BD00	57,400	GD00	62,400	KD00
52,500	BE00	57,500	GE00	62,500	KE00
52,600	BF00	57,600	GF00	62,600	KF00
52,700	BG00	57,700	GG00	62,700	KG00
52,800	BH00	57,800	GH00	62,800	KH00
52,900	BI00	57,900	GI00	62,900	KI00
53,000	CA00	58,000	HA00	63,000	LA00
53,100	CA00	58,100	HA00	63,100	LA00
53,200	CE00	58,200	HB00	63,200	LB00
53,300	CC00	58,300	HC00	63,300	LC00
53,400	CD00	58,400	HD00	63,400	LD00
53,500	CE00	58,500	HE00	63,500	LE00
53,600	CF00	58,600	HF00	63,600	LF00
53,700	CG00	58,700	HG00	63,700	LG00
53,800	CH00	58,800	HH00	63,800	LH00
53,900	CI00	58,900	HI00	63,900	LI00
54,000	DA00	59,000	IA00	64,000	MA00
54,100	DA00	59,100	IA00	64,100	MA00
54,200	DB00	59,200	IB00	64,200	MB00
54,300	DC00	59,300	IC00	64,300	MC00
54,400	DD00	59,400	ID00	64,400	MD00
54,500	DE00	59,500	IE00	64,500	ME00
54,600	DF00	59,600	IF00	64,600	MF00
54,700	DG00	59,700	IG00	64,700	MG00
54,800	DH00	59,800	IH00	64,800	MH00
54,900	DI00	59,900	II00	64,900	MI00
55,000	EA00	60,000	-L00	65,000	NA00
55,100	EA00	60,100	-A00	65,100	NA00
55,200	EB00	60,200	-B00	65,200	NE00
55,300	EC00	60,300	-C00	65,300	NC00
55,400	ED00	60,400	-D00	65,400	ND00
55,500	EE00	60,500	-E00	65,500	NE00
55,600	EF00	60,600	-F00	65,600	NF00
55,700	EG00	60,700	-G00	65,700	NG00
55,800	EH00	60,800	-H00	65,800	NH00
55,900	EI00	60,900	-I00	65,900	NI00
56,000	FA00	61,000	JA00	66,000	OA00
56,100	FA00	61,100	JA00	66,100	OA00
56,200	FB00	61,200	JB00	66,200	OB00
56,300	FC00	61,300	JC00	66,300	OC00
56,400	FD00	61,400	JD00	66,400	OD00
56,500	FE00	61,500	JE00	66,500	OE00
56,600	FF00	61,600	JF00	66,600	OF00
56,700	FG00	61,700	JG00	66,700	OG00
56,800	FH00	61,800	JH00	66,800	OH00
56,900	FI00	61,900	JI00	66,900	OI00

APPENDIX A

MEMORY LOCATIONS AND ADDRESSES (Cont'd)

Memory Location	Address		Memory Location	Address		Memory Location	Address
67,000	P&00		72,000	S&00		77,000	X&00
67,100	PA00		72,100	SA00		77,100	XA00
67,200	PB00		72,200	SB00		77,200	XB00
67,300	PC00		72,300	SC00		77,300	XC00
67,400	PD00		72,400	SD00		77,400	XD00
67,500	PE00		72,500	SE00		77,500	XE00
67,600	PF00		72,600	SF00		77,600	XF00
67,700	PG00		72,700	SG00		77,500	XG00
67,800	PH00		72,800	SH00		77,800	XH00
67,900	PI00		72,900	SI00		77,900	XI00
68,000	Q&00		73,000	T&00		78,000	Y&00
68,100	QA00		73,100	TA00		78,100	YA00
68,200	QB00		73,200	TB00		78,200	YB00
68,300	QC00		73,300	TC00		78,300	YC00
68,400	QD00		73,400	TD00		78,400	YD00
68,500	QE00		73,500	TE00		78,500	YE00
68,600	QF00		73,600	TF00		78,600	YF00
68,700	QG00		73,700	TG00		78,700	YG00
68,800	QH00		73,800	TH00		78,800	YH00
68,900	QI00		73,900	TI00		78,900	YI00
69,000	R&00		74,000	U&00		79,000	Z&00
69,100	RA00		74,100	UA00		79,100	ZA00
69,200	RB00		74,200	UB00		79,200	ZB00
69,300	RC00		74,300	UC00		79,300	ZC00
69,400	RD00		74,400	UD00		79,400	ZD00
69,500	REG0		74,500	UE00		79,500	ZE00
69,600	RF00		74,600	UF00		79,600	ZF00
69,700	RG00		74,700	UG00		79,700	ZG00
69,800	RH00		74,800	UH00		79,800	ZH00
69,900	RI00		74,900	UI00		79,900	ZI00
70,000	"&00		75,000	V&00		80,000	0-00
70,100	"A00		75,100	VA00		80,100	0J00
70,200	"B00		75,200	VB00		80,200	0K00
70,300	"C00		75,300	VC00		80,300	0L00
70,400	"D00		75,400	VD00		80,400	0M00
70,500	"E00		75,500	VE00		80,500	0N00
70,600	"F00		75,600	VF00		80,600	0O00
70,700	"G00		75,700	VG00		80,700	0P00
70,800	"H00		75,800	VH00		80,800	0Q00
70,900	"I00		75,900	VI00		80,900	0R00
71,000	/&00		76,000	W&00		81,000	1-00
71,100	/A00		76,100	WA00		81,100	1J00
71,200	/B00		76,200	WB00		81,200	1K00
71,300	/C00		76,300	WC00		81,300	1L00
71,400	/D00		76,400	WD00		81,400	1M00
71,500	/E00		76,500	WE00		81,500	1N00
71,600	/F00		76,600	WF00		81,600	1O00
71,700	/G00		76,700	WG00		81,700	1P00
71,800	/H00		76,800	WH00		81,800	1Q00
71,900	/I00		76,900	WI00		81,900	1R00

APPENDIX A

MEMORY LOCATIONS AND ADDRESSES (Cont'd)

Memory Location	Address	Memory Location	Address	Memory Location	Address
82,000	2-00	87,000	7-00	92,000	B-00
82,100	2J00	87,100	7J00	92,100	BJ00
82,200	2K00	87,200	7K00	92,200	BK00
82,300	2L00	87,300	7L00	92,300	BL00
82,400	2M00	87,400	7M00	92,400	BM00
82,500	2N00	87,500	7N00	92,500	BN00
82,600	2O00	87,600	7O00	92,600	BO00
82,700	2P00	87,700	7P00	92,700	BP00
82,800	2Q00	87,800	7Q00	92,800	BQ00
82,900	2R00	87,900	7R00	92,900	BR00
83,000	3-00	88,000	8-00	93,000	C-00
83,100	3J00	88,100	8J00	93,100	CJ00
83,200	3K00	88,200	8K00	93,200	CK00
83,300	3L00	88,300	8L00	93,300	CL00
83,400	3M00	88,400	8M00	93,400	CM00
83,500	3N00	88,500	8N00	93,500	CN00
83,600	3O00	88,600	8O00	93,600	CO00
83,700	3P00	88,700	8P00	93,700	CP00
83,800	3Q00	88,800	8Q00	93,800	CQ00
83,900	3R00	88,900	8R00	93,900	CR00
84,000	4-00	89,000	9-00	94,000	D-00
84,100	4J00	89,100	9J00	94,100	DJ00
84,200	4K00	89,200	9K00	94,200	DK00
84,300	4L00	89,300	9L00	94,300	DL00
84,400	4M00	89,400	9M00	94,400	DM00
84,500	4N00	89,500	9N00	94,500	DN00
84,600	4O00	89,600	9O00	94,600	DO00
84,700	4P00	89,700	9P00	94,700	DP00
84,800	4Q00	89,800	9Q00	94,800	DQ00
84,900	4R00	89,900	9R00	94,900	DR00
85,000	5-00	90,000	A-00	95,000	E-00
85,100	5J00	90,100	AJ00	95,100	EJ00
85,200	5K00	90,200	AK00	95,200	EK00
85,300	5L00	90,300	AL00	95,300	EL00
85,400	5M00	90,400	AM00	95,400	EM00
85,500	5N00	90,500	AN00	95,500	EN00
85,600	5O00	90,600	AO00	95,600	EO00
85,700	5P00	90,700	AP00	95,700	EP00
85,800	5Q00	90,800	AQ00	95,800	EQ00
85,900	5R00	90,900	AR00	95,900	ER00
86,000	6-00	91,000	A-00	96,000	F-00
86,100	6J00	91,100	AJ00	96,100	FJ00
86,200	6K00	91,200	AK00	96,200	EK00
86,300	6L00	91,300	AL00	96,300	FL00
86,400	6M00	91,400	AM00	96,400	FM00
86,500	6N00	91,500	AN00	96,500	FN00
86,600	6O00	91,600	AO00	96,600	FO00
86,700	6P00	91,700	AP00	96,700	FP00
86,800	6Q00	91,800	AQ00	96,800	FQ00
86,900	6R00	91,900	AR00	96,900	FR00

APPENDIX A

MEMORY LOCATIONS AND ADDRESSES (Cont'd)

Memory Location	Address		Memory Location	Address		Memory Location	Address
97,000	G-00		102,000	K-00		107,000	P-00
97,100	GJ00		102,100	KJ00		107,100	PJ00
97,200	GK00		102,200	KK00		107,200	PK00
97,300	GL00		102,300	KL00		107,300	PL00
97,400	GM00		102,400	KM00		107,400	PM00
97,500	GN00		102,500	KN00		107,500	PN00
97,600	GO00		102,600	KO00		107,600	PO00
97,700	GP00		102,700	KP00		107,700	PP00
97,800	GQ00		102,800	KQ00		107,800	PQ00
97,900	GR00		102,900	KR00		107,900	PR00
98,000	H-00		103,000	L-00		108,000	Q-00
98,100	HJ00		103,100	LJ00		108,100	QJ00
98,200	HK00		103,200	LK00		108,200	QK00
98,300	HL00		103,300	LL00		108,300	QL00
98,400	HM00		103,400	LM00		108,400	QM00
98,500	HN00		103,500	LN00		108,500	QN00
98,600	HO00		103,600	LO00		108,600	QO00
98,700	HP00		103,700	LP00		108,700	QP00
98,800	HQ00		103,800	LQ00		108,800	QQ00
98,900	HR00		103,900	LR00		108,900	QR00
99,000	I-00		104,000	M-00		109,000	R-00
99,100	IJ00		104,100	MJ00		109,100	RJ00
99,200	IK00		104,200	MK00		109,200	RK00
99,300	IL00		104,300	ML00		109,300	RL00
99,400	IM00		104,400	MM00		109,400	RM00
99,500	IN00		104,500	MN00		109,500	RN00
99,600	IO00		104,600	MO00		109,600	RO00
99,700	IP00		104,700	MP00		109,700	RP00
99,800	IQ00		104,800	MQ00		109,800	RQ00
99,900	IR00		104,900	MR00		109,900	RR00
100,000	--00		105,000	N-00		110,000	"-00
100,100	-J00		105,100	NJ00		110,100	"J00
100,200	-K00		105,200	NK00		110,200	"K00
100,300	-L00		105,300	NL00		110,300	"L00
100,400	-M00		105,400	NM00		110,400	"M00
100,500	-N00		105,500	NN00		110,500	"N00
100,600	-O00		105,600	NO00		110,600	"O00
100,700	-P00		105,700	NP00		110,700	"P00
100,800	-Q00		105,800	NQ00		110,800	"Q00
100,900	-R00		105,900	NR00		110,900	"R00
101,000	J-00		106,000	O-00		111,000	/-00
101,100	JJ00		106,100	OJ00		111,100	/J00
101,200	JK00		106,200	OK00		111,200	/K00
101,300	JL00		106,300	OL00		111,300	/L00
101,400	JM00		106,400	OM00		111,400	/M00
101,500	JN00		106,500	ON00		111,500	/N00
101,600	JO00		106,600	OO00		111,600	/O00
101,700	JP00		106,700	OP00		111,700	/P00
101,800	JQ00		106,800	OQ00		111,800	/Q00
101,900	JR00		106,900	OR00		111,900	/R00

APPENDIX A

MEMORY LOCATIONS AND ADDRESSES (Cont'd)

Memory Location	Address	Memory Location	Address	Memory Location	Address
112,000	S-00	117,000	X 00	122,000	2"00
112,100	SJ00	117,100	XJ00	122,100	2/00
112,200	SK00	117,200	XK00	122,200	2S00
112,300	SL00	117,300	XL00	122,300	2T00
112,400	SM00	117,400	XM00	122,400	2U00
112,500	SN00	117,500	XN00	122,500	2V00
112,600	SO00	117,600	XO00	122,600	2W00
112,700	SP00	117,700	XP00	122,700	2X00
112,800	SQ00	117,800	XQ00	122,800	2Y00
112,900	SR00	117,900	XR00	122,900	2Z00
113,000	T-00	118,000	Y-00	123,000	3"00
113,100	TJ00	118,100	YJ00	123,100	3/00
113,200	TK00	118,200	YK00	123,200	3S00
113,300	TL00	118,300	YL00	123,300	3T00
113,400	TM00	118,400	YM00	123,400	3U00
113,500	TN00	118,500	YN00	123,500	3V00
113,600	TO00	118,600	YO00	123,600	3W00
113,700	TP00	118,700	YP00	123,700	3X00
113,800	TQ00	118,800	YQ00	123,800	3Y00
113,900	TR00	118,900	YR00	123,900	3Z00
114,000	U-00	119,000	Z-00	124,000	4"00
114,100	UJ00	119,100	ZJ00	124,100	4/00
114,200	UK00	119,200	ZK00	124,200	4S00
114,300	UL00	119,300	ZL00	124,300	4T00
114,400	UM00	119,400	ZM00	124,400	4U00
114,500	UN00	119,500	ZN00	124,500	4V00
114,600	UO00	119,600	ZO00	124,600	4W00
114,700	UP00	119,700	ZP00	124,700	4X00
114,800	UQ00	119,800	ZQ00	124,800	4Y00
114,900	UR00	119,900	ZR00	124,900	4Z00
115,000	V-00	120,000	0"00	125,000	5"00
115,100	VJ00	120,100	0/00	125,100	5/00
115,200	VK00	120,200	0S00	125,200	5S00
115,300	VL00	120,300	0T00	125,300	5T00
115,400	VM00	120,400	0U00	125,400	5U00
115,500	VN00	120,500	0V00	125,500	5V00
115,600	VO00	120,600	0W00	125,600	5W00
115,700	VP00	120,700	0X00	125,700	5X00
115,800	VQ00	120,800	0Y00	125,800	5Y00
115,900	VR00	120,900	0Z00	125,900	5Z00
116,000	W-00	121,000	1"00	126,000	6"00
116,100	WJ00	121,100	1/00	126,100	6/00
116,200	WK00	121,200	1S00	126,200	6S00
116,300	WL00	121,300	1T00	126,300	6T00
116,400	WM00	121,400	1U00	126,400	6U00
116,500	WN00	121,500	1V00	126,500	6V00
116,600	WO00	121,600	1W00	126,600	6W00
116,700	WP00	121,700	1X00	126,700	6X00
116,800	WQ00	121,800	1Y00	126,800	6Y00
116,900	WR00	121,900	1Z00	126,900	6Z00

APPENDIX A

MEMORY LOCATIONS AND ADDRESSES (Cont'd)

Memory Location	Address		Memory Location	Address		Memory Location	Address
127,000	7"00		132,000	B"00		137,000	G"00
127,100	7/00		132,100	B/00		137,100	G/00
127,200	7S00		132,200	BS00		137,200	GS00
127,300	7T00		132,300	BT00		137,300	GT00
127,400	7U00		132,400	BU00		137,400	GU00
127,500	7V00		132,500	BV00		137,500	GV00
127,600	7W00		132,600	BW00		137,600	GW00
127,700	7X00		132,700	BX00		137,700	GX00
127,800	7Y00		132,800	BY00		137,800	GY00
127,900	7Z00		132,900	BZ00		137,900	GZ00
128,000	8"00		133,000	C"00		138,000	H"00
128,100	8/00		133,100	C/00		138,100	H/00
128,200	8S00		133,200	CS00		138,200	HS00
128,300	8T00		133,300	CT00		138,300	HT00
128,400	8U00		133,400	CU00		138,400	HU00
128,500	8V00		133,500	CV00		138,500	HV00
128,600	8W00		133,600	CW00		138,600	HW00
128,700	8X00		133,700	CX00		138,700	HX00
128,800	8Y00		133,800	CY00		138,800	HY00
128,900	8Z00		133,900	CZ00		138,900	HZ00
129,000	9"00		134,000	D"00		139,000	I"00
129,100	9/00		134,100	D/00		139,100	I/00
129,200	9S00		134,200	DS00		139,200	IS00
129,300	9T00		134,300	DT00		139,300	IT00
129,400	9U00		134,400	DU00		139,400	IU00
129,500	9V00		134,500	DV00		139,500	IV00
129,600	9W00		134,600	DW00		139,600	IW00
129,700	9X00		134,700	DX00		139,700	IX00
129,800	9Y00		134,800	DY00		139,800	IY00
129,900	9Z00		134,900	DZ00		139,900	IZ00
130,000	&"00		135,000	E"00		140,000	- "00
130,100	&/00		135,100	E/00		140,100	- /00
130,200	&S00		135,200	ES00		140,200	- S00
130,300	&T00		135,300	ET00		140,300	- T00
130,400	&U00		135,400	EU00		140,400	- U00
130,500	&V00		135,500	EV00		140,500	- V00
130,600	&W00		135,600	EW00		140,600	- W00
130,700	&X00		135,700	EX00		140,700	- X00
130,800	&Y00		135,800	EY00		140,800	- Y00
130,900	&Z00		135,900	EZ00		140,900	- Z00
131,000	A"00		136,000	F"00		141,000	J"00
131,100	A/00		136,100	F/00		141,100	J/00
131,200	AS00		136,200	FS00		141,200	JS00
131,300	AT00		136,300	FT00		141,300	JT00
131,400	AU00		136,400	FU00		141,400	JU00
131,500	AV00		136,500	FV00		141,500	JV00
131,600	AW00		136,600	FW00		141,600	JW00
131,700	AX00		136,700	FX00		141,700	JX00
131,800	AY00		136,800	FY00		141,800	JY00
131,900	AZ00		136,900	FZ00		141,900	JZ00

APPENDIX A

MEMORY LOCATIONS AND ADDRESSES (Cont'd)

Memory Location	Address	Memory Location	Address	Memory Location	Address
142,000	K*00	147,000	P*00	152,000	S*00
142,100	K/00	147,100	P/00	152,100	S/00
142,200	KS00	147,200	PS00	152,200	SS00
142,300	KT00	147,300	PT00	152,300	ST00
142,400	KU00	147,400	PU00	152,400	SU00
142,500	KV00	147,500	PV00	152,500	SV00
142,600	KW00	147,600	PW00	152,600	SW00
142,700	KX00	147,700	PX00	152,700	SX00
142,800	KY00	147,800	PY00	152,800	SY00
142,900	KZ00	147,900	PZ00	152,900	SZ00
143,000	L*00	148,000	Q*00	153,000	T*00
143,100	L/00	148,100	Q/00	153,100	T/00
143,200	LS00	148,200	QS00	153,200	TS00
143,300	LT00	148,300	QT00	153,300	TT00
143,400	LU00	148,400	QU00	153,400	TU00
143,500	LV00	148,500	QV00	153,500	TV00
143,600	LW00	148,600	QW00	153,600	TW00
143,700	LX00	148,700	QX00	153,700	TX00
143,800	LY00	148,800	QY00	153,800	TY00
143,900	LZ00	148,900	QZ00	153,900	TZ00
144,000	M*00	149,000	R*00	154,000	U*00
144,100	M/00	149,100	R/00	154,100	U/00
144,200	MS00	149,200	RS00	154,200	US00
144,300	MT00	149,300	RT00	154,300	UT00
144,400	MU00	149,400	RU00	154,400	UU00
144,500	MV00	149,500	RV00	154,500	UV00
144,600	MW00	149,600	RW00	154,600	UW00
144,700	MX00	149,700	RX00	154,700	UX00
144,800	MY00	149,800	RY00	154,800	UY00
144,900	MZ00	149,900	RZ00	154,900	UZ00
145,000	N*00	150,000	*00	155,000	V*00
145,100	N/00	150,100	/00	155,100	V/00
145,200	NS00	150,200	*S00	155,200	VS00
145,300	NT00	150,300	*T00	155,300	VT00
145,400	NU00	150,400	*U00	155,400	VU00
145,500	NV00	150,500	*V00	155,500	VV00
145,600	NW00	150,600	*W00	155,600	VW00
145,700	NX00	150,700	*X00	155,700	VX00
145,800	NY00	150,800	*Y00	155,800	VY00
145,900	NZ00	150,900	*Z00	155,900	VZ00
146,000	O*00	151,000	/00	156,000	W*00
146,100	O/00	151,100	/00	156,100	W/00
146,200	OS00	151,200	/S00	156,200	WS00
146,300	OT00	151,300	/T00	156,300	WT00
146,400	OU00	151,400	/U00	156,400	WU00
146,500	OV00	151,500	/V00	156,500	WV00
146,600	OW00	151,600	/W00	156,600	WW00
146,700	OX00	151,700	/X00	156,700	WX00
146,800	OY00	151,800	/Y00	156,800	WY00
146,900	OZ00	151,900	/Z00	156,900	WZ00

MEMORY LOCATIONS AND ADDRESSES (Cont'd)

A-9

APPENDIX B

LOCATION SYMBOLS OF MICRO MAGNETIC MEMORY REGISTERS

LOCATION SYMBOL	CONTENTS OF MMM LOCATION	LOCATION SYMBOL	CONTENTS OF MMM LOCATION
1	P Register	G	STPR (Real-Time Interrupt)
2	A Register	I	General Interrupt Routine Entry
4	B Register	+	A (Simo 1 Instruction)
5	T Register	.	O and N (Simo 1 Instruction)
6	C Register	;	B (Simo 1 Instruction)
7	E Register	;	Multiply/Divide (MD1)
8(or 3)	S Register	,	Multiply/Divide (MD2)
9	P (General Interrupt)	C _R	Multiply/Divide (MD3)
]	A (General Interrupt)	J	Multiply/Divide (MD4)
#	STA (General Interrupt)	K	A (Simo 2 Instruction)
@	B (General Interrupt)	L	O and N (Simo 2 Instruction)
(	STP (General Interrupt)	M	B (Simo 2 Instruction)
)	Control Register (General Interrupt)	R	Stop P (P Address on Stop)
e	STPR (General Interrupt)	S	Index Field 1
A	P (Real-Time Interrupt)	T	Increment Field 1
B	A (Real-Time Interrupt)	U	Index Field 2
C	STA (Real-Time Interrupt)	V	Increment Field 2
D	B (Real-Time Interrupt)	W	Index Field 3
E	STP (Real-Time Interrupt)	X	Increment Field 3
F	Control Register (Real-Time Interrupt)	Z	Real-Time Interrupt Routine Entry

APPENDIX C
PRIMING CODES

DEVICE DESCRIPTION	CODE	PRIMING FUNCTION
Card Reader	0	Translate Mode
Card Reader	1	Binary Mode
Printer	0	Standard Print Table - Prime Code should always be zero for the Printer.
3485 Magnetic Tape	0	Do not prime
3485 Magnetic Tape	1	Density 800, RCA Mode ✓
3485 Magnetic Tape	2	Density 556, RCA Mode ✓
3485 Magnetic Tape	3	Density 200, RCA Mode ✓
3485 Magnetic Tape	4	Density 800, Non RCA Mode, Even Parity
3485 Magnetic Tape	5	Density 556, Non RCA Mode, Even Parity
3485 Magnetic Tape	6	Density 200, Non RCA Mode, Even Parity
3485 Magnetic Tape	7	Density 800, Non RCA Mode, Odd Parity
3485 Magnetic Tape	8	Density 556, Non RCA Mode, Odd Parity
3485 Magnetic Tape	9	Density 200, Non RCA Mode, Odd Parity
Other Devices	0	Prime codes must be zero for other devices

Note: If other than the standard print table is desired by the user, he must
ISSUE a WRT command to the printer, transmitting the desired print table.

APPENDIX D

FCP DEVICE TERMINATION CONDITIONS

If error recovery is unsuccessful, the conditions that caused the abnormal termination may be found in the user's device region. The conditions are stored in a four-character area located at the region or file address + \$10, 11, 12 and 13, and are referred to as A, B, C, and D respectively. Characters A and B refer to the area and command, and characters C and D refer to the condition causing abnormal termination. The C and D characters have previously been referred to as the device termination conditions (DTC) characters.

Following is a breakdown of these characters and their meanings to specific devices.

FCP DEVICE TERMINATION CONDITIONS A & B CHARACTERS

Device	Char. Position	Bit Position	Numerical Equiv.	Condition
Magnetic Tape Table	A	$2^0=1$	1	Area busy
	A	$2^1=1$	2	Area not busy first time
	B	$2^1=1$	2	Issue command queued
	B	$2^2=1$	4	Command initiated
	B	$2^3=1$	8	File or device not present
	B	$2^4=1$	&	Command terminated normally
	B	$2^5=1$	-	Command terminated abnormally.

Although the device was shown as magnetic tape, these same A & B characters apply to the following devices:

Card Reader
Card Punch
Paper Tape Reader
Paper Tape Punch
On-Line Printer
Console Typewriter

APPENDIX D (continued)

FCP DEVICE TERMINATION CONDITIONS C & D CHARACTERS

Device	Char. Pos.	Bit Pos.	Num. Equ.	Condition
Magnetic Tape	C	2 ⁰ =1	1	The device is inoperable.
	C	2 ² =1	4	ETW has been sensed.
	C	2 ³ =1	8	The tape is at BTC.
	C	2 ⁵ =1	-	Splice is detected.
	D	2 ⁰ =1	1	Read or write parity error detected.
	D	2 ¹ =1	2	Magnetic tape alarm.
	D	2 ² =1	4	A=B equality and no gap sensed.
	D	2 ³ =1	8	EF - ED indicator set.
	D	2 ⁴ =1	&	Device not follow (DNF) received.
	D	2 ⁵ =1	-	IR #11 received at I/O initiation.
Card Reader	C	2 ⁰ =1	1	The device is inoperable.
	C	2 ² =1	4	There is a photo-diode failure.
	C	2 ³ =1	8	There is a multi-punch error.
	D	2 ³ =1	8	EF indicator is set.
	D	2 ⁴ =1	&	Device not follow (DNF) received.
	D	2 ⁵ =1	-	IR #11 received at I/O initiation.
Card Punch	C	2 ⁰ =1	1	The device is inoperable.
	C	2 ² =1	4	There is a punch compare error.
	C	2 ³ =1	8	There is a parity error.
	D	2 ⁴ =1	&	Device not follow (DNF) received.
	D	2 ⁵ =1	-	IR #11 received at I/O initiation.
Paper Tape Reader	C	2 ⁰ =1	1	The device is inoperable.
	C	2 ³ =1	8	Read parity error detected.
	D	2 ² =1	4	A=B equality and no gap sensed.
	D	2 ³ =1	8	EF = ED indicator set.
	D	2 ⁴ =1	&	Device not follow (DNF) received.
	D	2 ⁵ =1	-	IR #11 received at I/O initiation.
Paper Tape Punch	C	2 ⁰ =1	1	The device is inoperable.
	C	2 ³ =1	8	Write parity error detected.
	D	2 ⁴ =1	&	Device not follow (DNF) received.
	D	2 ⁵ =1	-	IR #11 received at I/O initiation.
On-Line Printer	C	2 ⁰ =1	1	The device is inoperable.
	C	2 ² =1	4	Low paper supply detected.
	C	2 ³ =1	8	Parity error received on write.
	D	2 ⁴ =1	&	Device not follow (DNF) received.
	D	2 ⁵ =1	-	IR #11 received at I/O initiation.
Console Typewriter		None		All error recovery is performed automatically. If errors occur the output or input command is re-executed. A FREEDV always exits to the normal path.

APPENDIX E

RCA 3301 OCTAL CODES

8 ⁰									
	0	1	2	3	4	5	6	7	
8 ¹	0	0	1	2	3	4	5	6	7
	1	8	9	space	#	@	open (	close)	e
	2	&	A	B	C	D	E	F	G
	3	H	I	+	period .	semi- colon ;	colon :	apostrophe '	plus- zero CR
	4	minus -	J	K	L	M	N	O	P
	5	Q	R	EI [	\$	*	ED >	EF <	sub 10 10
	6	quotation "	/	S	T	U	V	W	X
	7	Y	Z	EB ÷	comma ,	%	ISS •	=	≠

APPENDIX F

RCA 3301 CARD CODE

CHARACTER	CARD CODE
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
Space	
#	3,8
@	4,8
Open (	5,8
Close)	6,8
e	7,8
&	Y
A	Y,1
B	Y,2
C	Y,3
D	Y,4
E	Y,5
F	Y,6
G	Y,7
H	Y,8
I	Y,9
+	Y,2,8

CHARACTER	CARD CODE
Period .	Y,3,8
Semi ;	Y,4,8
Colon :	Y,5,8
Apost. '	Y,6,8
Plus Zero	Y,0
Minus -	X
J	X,1
K	X,2
L	X,3
M	X,4
N	X,5
O	X,6
P	X,7
Q	X,8
R	X,9
EI [	X,2,8
\$	X,3,8
*	X,4,8
ED >	X,5,8
EF <	X,6,8
Sub ₁₀ 10	X,7,8
Quotes "	X,0
/	0,1
S	0,2
T	0,3
U	0,4
V	0,5

APPENDIX F

RCA 3301 CARD CODE (Cont'd)

CHARACTER	CARD CODE
W	0,6
X	0,7
Y	0,8
Z	0,9
EB ÷	0,2,8

CHARACTER	CARD CODE
Comma ,	0,3,8
%	0,4,8
ISS ↑	0,5,8
=	0,6,8
□	0,7,8

X = 11 Zone
Y = 12 Zone

APPENDIX G

RCA 3301 SYMBOLS USED FOR N CHARACTER COUNTS EXCEPT THE REPEAT AND PAPER
ADVANCE INSTRUCTIONS

SYMBOL	N COUNT	SYMBOL	N COUNT	SYMBOL	N COUNT
0	0	F	16	/	31
1	1	G	17	S	32
2	2	H	18	T	33
3	3	I	19	U	34
4	4	-	20	V	35
5	5	J	21	W	36
6	6	K	22	X	37
7	7	L	23	Y	38
8	8	M	24	Z	39
9	9	N	25	÷	40
&	10	O	26	,	41
A	11	P	27	%	42
B	12	Q	28	↑	43
C	13	R	29	=	44
D	14	"	30	⌘	45
E	15				

APPENDIX H

RCA 3301 SYMBOLS USED FOR N CHARACTER COUNTS WITH
THE REPEAT AND PAPER ADVANCE INSTRUCTIONS

SYMBOL	N COUNT
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
]	10
#	11
@	12
(	13
)	14
e	15

APPENDIX I

MEMORY DUMP FORMATS

The Memory Dump routines edit the contents of memory to an on-line printer or to the diagnostic device. The purpose of this memorandum is to describe the output listing format of these routines. Three methods for obtaining a memory dump are available on the 3301; 1) Console routine 17 - Memory Dump; 2) Console routine 16 - Snapshot Print; and 3) Emergency Dump.

1. Console routine 17 prints the total memory contents of a specified task, the entire memory, or the contents of memory between two actual specified addresses.
2. Console routine 16 prints up to four selected sequences of the process within which the Snapshot Print is contained.
3. The Emergency Dump prints the entire memory, or the contents of memory between two actual specified addresses.

Format Options

Three format options are available when console routine 17 is specified:

- 1) Instruction format; 2) data format; and 3) instruction and data format.

Option 3 is always used with the Snapshot Print and Emergency Dump.

The format options are as follows:

1. Instruction format - four-character machine addresses are converted to six-character addresses; i.e., ZZ99 becomes 159999. Index registers are printed as numeric characters (0-3). Indirect addressing bits remain on the RHE character of the address. Two lines are printed for each instruction.

<u>Line</u>	<u>No. of Chars.</u>	<u>Contents</u>
1	1	- operation code
	1	- N character
	1	- space
	6	- converted A address
2	1	- index register for A address
	1	- index register for B address
	1	- space
	6	- converted B address

Example

- a. Instruction in memory; M4TR9IZII8
- b. Description:

- 1) TCL of four characters
- 2) A address is 113,999 with indirect addressing
- 3) B address is 79,998 modified by index register 1

APPENDIX I

MEMORY DUMP FORMATS (Cont'd)

Example (cont'd)

c. Memory dump format:

M4 - 11399I-
01 - 079998-

2. Data Format - all characters are printed exactly as they are in memory. One line is required for data format.
3. Instruction and data format - three lines are required. The first two lines are instruction format, the third line is data format.

General Format

1. The memory dumps print all characters as shown in Appendix VIII of the System Reference Manual with the exception of the octal 17 (error character) which is represented by the absence of a symbol.
2. One hundred characters are edited for each print line. A print line may be from 1-3 actual lines depending upon the format option specified. Three lines of print for each series of 100 characters are required for Snapshot Prints and the Emergency Dump.
3. The Emergency Dump prints characters in 10-character blocks, 10 blocks to a line. All other dumps print characters in 20-character blocks, 5 blocks to a line.
4. The first line printed for each series of 100 characters provides additional information as follows:
 - a. Emergency Dump - contains only the six-character actual memory address for the first decade in the print line.
 - b. Snapshot Print and Task portion of console routine 17 - contains a two-character sequence ID, a five-character address showing the sequence relative address of the first decade in the print line, and a six-character actual memory address for the first decade in the print line. Due to print line limitations, the rightmost character (zero) of the sequence relative address is truncated; i.e., 00040 represents sequence relative location 000400.
 - c. Console routine 17 (entire memory) - contains a six-character actual memory address for the first decade in the print line. Sequence information is not provided. Sequence ID contains **, and the sequence relative address is a six-character truncated version of the actual address.
5. If the contents of a print line are equal to the last decade of the previous print line (all zeros, all spaces, etc.), the line is not printed. A constant (*EQUALITY*) is printed the first time this is detected. No further printing occurs until a print line is found that is not equal to that decade.

APPENDIX I

MEMORY DUMP FORMATS (Cont'd)

6. When an actual location in the memory of a sequence does not start in an even hundreds, the first print line for that sequence indicates the decade of the actual start of the sequence. This is only provided when the Snapshot Print or the Task option of console routine 17 is utilized. When this condition exists, the sequence relative address is not provided, but rather a count is printed in those positions showing the number of decades that are not part of the sequence. This condition is signaled by placing a minus sign between the sequence relative location and the actual location. An example of this is shown below giving only the first 16 characters of each print line. Shown below are the two-character sequence ID, the five-character sequence relative address, and the six-character actual address.

(a) 02 00001-001400
(b) 02 00009-001500
(c) 02 00019-001600

Sequence 02 is being printed.

- (a) The minus sign shows that sequence 02 does not start at an even hundreds location. 00001 shows that the first decade on this print line is not part of sequence 02. The line therefore contains sequence-relative locations 000000 through 000089 only.
- (b) Represents sequence-relative locations 000090 through 000189.
- (c) Represents sequence-relative locations 000190 through 000289.
7. The first printed line on the memory dump contains information as to the type of dump specified, and in two instances the register settings at the time the dump was taken. The Snapshot Print also reflects the number of times the specified snapshot print has been executed. The following page shows the first line printed for each type of memory dump. For the Emergency Dump, this line is not printed.

APPENDIX I

MEMORY DUMP FORMATS (Cont'd)

- (1) \$DUMP ID (NOTE 1) REGISTERS P Reg A Reg B Reg STA STP Control STPR M1 I1 M2 I2 M3 I3
- (2) \$SNAP ID (NOTE 1) # xx REG P Reg A Reg B Reg STA STP Control STPR M1 I1 M2 I2 M3 I3
- (3) \$DUMP

NOTE 1 - contains the process ID and segment # whose memory contents are being printed.

- (1) First line when console routine 17 is specified and a task dump is requested. This line is repeated each time a new segment is printed.
- (2) First line when console routine 16 (Snapshot Print) is specified. # xx represents the number of times the specified snapshot print has been executed.
- (3) First line when console routine 17 is specified and a total memory dump is requested. Registers and Process-Segment ID are not printed.

APPENDIX I

MEMORY DUMP FORMATS (Cont'd)

Examples:

Sample memory dumps are shown on the following pages. Two sequences are shown with a separate example of the way that they would be printed for (1) console routine 17 (Task), (2) console routine 17 (Entire Memory, and (3) Emergency Dump. Snapshot Print is not shown because, with the exception of the first line, it is exactly the same format as (1) above. A description of each line follows each example.

APPENDIX I

MEMORY DUMP FORMATS (Cont'd)

SAMPLE MEMORY DUMP (Console Routine 17-Task)

(1) \$DUMP ID ALPHA01 REGISTERS 002040 042723 042720 053410 002030 000400 053270 002310 000000 000100 000000 000000 010200

```
(2) 01 00000 002800 V1 000103 V1 000103 V1 000103 Y5 000000 M5 000000 W1 002910 M2 002858 V1 000103 W1 000000 JJ JJJJJJ
(3) 10 05252G 10 05353E 10 05353E 20 003080 20 003080 00 002910 01 000104 10 052531 00 002910 JJ JJJJJJ
(4) V101&3BE2GV101&3BE3A. V101&3BE2EY500-03080 M500=03080W129102910 M2285801&4V101&3BE3I W.00002910JJJJJJJJJJ
```

(5) *EQUALITY*

(6)	01	00050	003300	V1 000219 V0 000219	W+ 002040 .0 000014	W. 000000 00 000010	TE 1523]1 TE 1523]1	IL 0554]]00 000000
(7)				00 00230I 00 002210	00 000000 00 000014	00 002140 00 000001	02 004 6K 01 004 6A	00]]]]]]00 000000
(8)				V10219230IV002192210	W+20400000.000140014	W.000021400000010001	TEST]14]OKTEST114]FA	ILED]]]]]0000000000
(9)	02	00006-003300		V1 000219 V0 000219	W+ 002040 .0 000014	W. 000000 00 000010	TE 1523]1 TE 1523]1	IL 0554]]00 000000
(10)				00 00230I 00 002210	00 000000 00 000014	00 002140 00 000001	02 004]6K 01 004]6A	00]]]]]]00 000000
(11)				V10219230IV002192210	W+20400000.000140014	W.000021400000010001	TEST]J4]OKTEST]J4]FA	ILED]]]]]0000000000
(12)	02	00004	003400	00 000000 Y5 065152	+= 14788H +\$ 076155	=4 008000 X" 05666A	20]]]]]] 12 003456	AB 05345F TY 0675]]
(13)				00 001720 10 085353	00 132920 23 158859	01 15706F 31 02552Z	00]]]]]] 00 00789%	11 05789J 01 00089A
(14)				0000001720Y5NAE25L53	+=PY8HB720+\$MAN5YYV9	=48000Z FFXXFF AN5BZ	20]]]]]]]]J123456789'	ABCDEFGHIJTYPE 108IA
(15)	02	00014	003500	V1 000219 EK 06753T	ES 11433S 11 0090	Y1 001379 W1 001160	M4 001298 M4 001274	M4 001262 V1 001385
(16)				00 00140I 10 05541R	32 08 70 00 0910	00 001380 00 001160	00 000222 00 000216	00 000212 00 001190
(17)				V10219140IEXPECTED]R	ESULTS]P=]]]90]]A-]]	Y113791380W111601160	M412980222M41274026	M412620212V113851190

APPENDIX I

MEMORY DUMP FORMATS (Cont'd)

- Line 1 - lists the Process-Segment ID (ALPHA01) and the register settings for that process.
- Line 2 - First line (instruction format) (OP, N and A address)
01 is the sequence number being listed
00000 shows that the first decade on this line is at relative location 000000 within sequence 01.
002800 shows that the first decade on this line is at actual memory location 2800.
- Line 3 - Second line (instruction format) (index registers and B address)
- Line 4 - Data format line.
- Line 5 - *Equality* shows that all lines not printed (actual locations 2900-3299) were equal to the last decade printed in the preceding line. In this example the last decade contained spaces.
- Lines 6,7 & 8 - show instruction and data format for actual locations 3300-3399 and relative locations 500 through 599 of sequence 01.
- Lines 9-17 - would normally be printed on a new page because a new sequence is being printed.
- Line 9 - First line (instruction format) (OP, N, and A address) 02 is the sequence number.
(00006-) shows that the first 6 decades on this print line are not part of sequence 02. Note that in this case actual locations 3300-3399 are printed twice: once for sequence 01 and once for sequence 02.
- Lines 10-11 - represent the second line (instruction format) and the data line.
- Lines 12,13 & 14 - instruction and data lines for sequence 02, relative locations 40 through 139, and actual locations 3400 through 3499.
- Lines 15,16 & 17 - instruction and data lines for sequence 02, relative locations 140 through 239, and actual locations 5500 through 3599.

APPENDIX I

MEMORY DUMP FORMATS (Cont'd)

SAMPLE MEMORY DUMP (Console Routine 17-Entire Memory)

(1) \$DUMP

(2) **00280 002800 V1 000103 V1 000103 V1 000103 Y5 000000 M5 000000 W1 002910 M2 002858 V1 00103 W. 000000]]]]]]]]
(3) 10 05252G 10 05253A 10 05353E 20 003080 00 003080 00 002910 01 000104 10 05253I 00 002910]]]]]]]]
(4) V101&3BE2GV101&3BE3A V101&3Be2EY500-03080 M500-03080W129102910 M2285801&4V101&3BE2I W.00002910]]]]]]]]

(5) *EQUALITY*

(6) **00330 003300 V1 000219 V0 000219 W+ 002040 .0 000014 W. 000000 00 000010 TE 1523] TE 1523]1 I1 0554]]00 000000
(7) 00 00230I 00 002210 00 000000 00 000014 Q0 002140 00 000001 02 004]6K 01 004]6A 000]]]]]]]] 00 000000
(8) V10219230IV002192210 W+20400000.000140014 W.000021400000010001 TEST]14]OKTEST]]4]FA ILED]]]]]00000000000
(9) **00340 003400 00 000000 Y5 065152 += 14788H +\$ 076155 -4 008000 X- 05666A 20]]]]]]]] 12 003456 AB 05345F TY 067511
(10) 00 001720 10 085353 00 132920 23 158859 01 15706F 31 02552Z 00]]]]]]]] 00 00789& 11 05789J 01 00089A
(11) 0000001720Y5NAE25L53 +=PY8HB720+\$WAN5YYV9 =48000X"FFX"FFWAN5BZ 20]]]]]]]]]123456789& ABCDEFGHIJTYPE]]081A
(12) 00350 003500 V1 000219 EX 06753T ES 11433S 11 0090]] Y1 001379 W1 001160 M4 001298 M4 001274 M4 001262 V1 001385
(13) 00 00140I 10 05541R 32 08]70] 00 0910]] 000 001380 00 001160 00 000222 00 000126 00 000212 00 001190
(14) V10219140IEXPECTED]R ESULTS]P= 1190]]A-]] Y113791380W111601160 M412980222M412740216 M412620212V113851190

APPENDIX I

MEMORY DUMP FORMATS (Cont'd)

- Line 1 - contains \$DUMP indicating that Console routine 17 was used, and that the entire memory was printed.
- Line 2 - First line (instruction format) (OP, N and A address)** is printed in place of sequence number.
- 00280 is the actual address of the first decade on this line, not a sequence relative address.
- 002800 shows that the first decade on this line is at actual memory location 2800.
- Line 3 - Second line (instruction format) (index registers and B address).
- Line 4 - Data format line
- Line 5 - *EQUALITY* shows that all lines not printed (actual locations 2900-3299) were equal to the last decade printed in the preceding line. In this example the last decade contained spaces.
- Lines 6,7 & 8 - show instruction and data format for actual locations 3300-3399.
- Lines 9,10 & - show instruction and data format for actual locations 3400-3499.
 11
- Lines 12,13 & - show instruction and data format for actual locations 3500-3599.
 14

APPENDIX I

MEMORY DUMP FORMATS (Cont'd)

SAMPLE MEMORY DUMP (Emergency Dump)

(1) 002800 V1 000103 V1 000103 V1 000103 Y5 000000 M5 000000 W1 002910 M2 002858 V1 000103 W. 000000]]]]]]]]
(2) 10 05252G 10 05253A 10 05253E 20 003080 20 003080 00 002910 01 000104 10 05253I 00 002910]]]]]]]]
(3) V101&3BE2G V101&3BE3A V101&3BE2E Y500-03080 M500-03080 W129102910 M2285801&4 V101&3BE2I W.00002910]]]]]]]]]]

(4) *EQUALITY*

(5) 003300 V1 000219 V0 000219 W+ 002040 .0 000014 W. 000000 00 000010 TE 1523]]1 TE 1523]]1 IL 0554]] 00 000000
(6) 00 00230I 00 002210 00 000000 00 000014 00 002140 00 000001 01 004]]6K 00 004]]6A 00]]]]]] 00 000000
(7) V10219230I V002192210 W+20400000 .000140014 W.00002140 0000010001 TEST]]4]]OK TEST]]41FA ILED]]]]]] 000000000000

(8) 003400 00 000000 Y5 065152 += 14788H +\$ 076155 -4 0080000 X" 05666A 20]]]]]] 12 003456 AB 05345F TY 067511
(9) 00 001720 10 085353 00 132920 23 158859 01 15706F 31 02552Z 00]]]]]] 00 00789& 11 05789J 01 00089A
(10) 0000001720 Y5NAE25L53 +=PY8HB720 +\$WAN5YYV9 =48000X FF X"FFWAN5BZ 20]]]]]]] 123456789& ABCDEFGHIJ TYPE]]08IA

(11) 003500 V1 000219 EX 06753T ES 11433S 11 0090]] Y1 001379 W1 001160 M4 001298 M4 001274 M4 001262 V1 001385
(12) 00 00140I 10 05541R 32 08]]70]] 00 0910]] 00 001380 00 001160 00 000222 00 000216 00 000212 00 001190
(13) V10219140I EXPECTEDIR ESULTS]]P-1 1190]]A-]] Y113791380 W111601160 M412980222 M412740216 M412620212 V113851190

APPENDIX I

MEMORY DUMP FORMATS (Cont'd)

- Line 1 - a heading line is not printed with an emergency dump.
Line 1 is the first line (instruction format) for actual locations 2800-2899.
002800 shows that the first decade on this line is at actual memory location 2800.
- Line 2 - Second line (instruction format) index registers and B address.
- Line 3 - Data format line.
- Line 4 - *EQUALITY* shows that all lines not printed (actual locations 2900-3299) were equal to the last decade printed in the preceding line. In this example the last decade contained spaces.
- Lines 5,6 & 7 - show instruction and data format for actual locations 3300-3399.
- Lines 8,9 & 10 - show instruction and data format for actual locations 3400-3499.
- Lines 11,12 & 13 - show instruction and data format for actual locations 3500-3599.

APPENDIX J

3301 FORTRAN II SYSTEM

This document describes the RCA 3301 FORTRAN II System. This system was developed for the 3301 by modifying the 305 version of the 301 FORTRAN System. The 3301 FORTRAN System contains its own operating system and interrupt routine. It does not use the 3301 Operating System for compilation or execution. It is a 3301 program and produces 3301 object programs; therefore, the 301 Compatibility Program is not required.

The system generates object programs of any size up to 160,000 character locations. It does not require nor make use of the 3301 high-speed arithmetic unit.

The system requires the following minimum equipment configuration:

1. Model 3303 Processor
2. Four magnetic tape stations. (For immediate execution of segmented programs following compilation, at least one additional tape station is required.)
3. Card reader and punch
4. On-line printer

For a description of the system refer to the RCA 301 FORTRAN System Manual (#93-24-000) dated March 1964. Except for Operating Procedures (Section XI), the Interrupt routine, and some system restrictions, all of which are described in this document, this manual contains the information necessary for programming and operating within this system.

A. OPERATING PROCEDURES

A control statement specifying the system work tapes and the memory size available for object program execution must be placed in front of the input run. The format of this control statement is:

Col.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	*	S	Y	S	T	E	M		t	t	t		n	n	n

Three work tapes, denoted as ttt, are required for compilation. Their actual (physical) trunk addresses must be punched in positions 9-11 of the *SYSTEM control statement. The high-order three digits of the size of memory available for object program execution, denoted as nnn, are punched in positions 13-15. For example, for 40K memory availability, punch 040; for 160K memory, punch 160. The designation nnn must be filled by one of the numbers: 040, 060, 080, 100, 120, 140, or 160.

To read in the first block of the compiler tape, a card containing the following four instructions, punched in positions 1-40, must be placed in front of the *SYSTEM control statement:

```
[0 0000 0000
4s 2000 0000 (where s is the actual trunk address of the com-
W4 0020 0020 piler tape)
W. 0000 2000
```

APPENDIX J

3301 FORTRAN II SYSTEM (Cont'd)

SYSTEM START

1. Mount the FORTRAN Compiler and work tapes.
2. Place the input in the card reader.
3. Ready the card punch.
4. Depress the LOAD CONSOLE button. Type in 4-00000000.. and depress the RELEASE button.
5. When computer halts, assuming no error lights, depress GEN RES.
6. Depress the LOAD CONSOLE button and then the RELEASE button.
7. When computer halts, assuming no error lights, depress START button to begin first job.

BEGIN NEXT JOB

To begin the next job if the present job terminates without returning control to the operating system:

1. Depress LOAD CONSOLE button.
2. Type $C_R \square^*$ 00091050W.00000500
3. Depress RELEASE.

DUMP MEMORY

To obtain a memory dump:

1. Depress LOAD CONSOLE button.
2. Type $C_R \square^*$ 00091070W.00000500
3. Depress RELEASE.

TAPE PRINT

To obtain a tape print:

1. Depress LOAD CONSOLE button.
2. Type $JX08470847C_R \square^*$ 00191320W.00000500
where X is the actual trunk address.
3. Depress RELEASE.

* $\square$ is $\begin{cases} A & \text{for halt at 0490 with Interrupt Indicators 01-05} \\ 9 & \text{for halt at 0490 with Interrupt Indicators 06-18} \\ 1 & \text{for other halts (In this case, it is not necessary to type W.00000500.)} \end{cases}$

APPENDIX J

3301 FORTRAN II SYSTEM (Cont'd)

FINISH SYSTEM

The control statement *FINISH terminates system operation. Processing may be continued by supplying more input and depressing the START button. If this control is omitted, the system will loop with Interrupt Indicator 11 lit when the card reader is empty. In this situation, processing may be resumed by first stopping the computer, supplying more input, and then depressing the START button.

ERROR STOPS

1. FORTRAN Operating System

Error halts in the FORTRAN Operating System are accompanied by an error message to the on-line printer. This message describes the error and suggests, where possible, the corrective action required.

2. Loading Object Program

Errors encountered when loading an object program result in the printing of a message that contains the contents of locations 0600-0679 (loader input-work area) in columns 1-80, and "LOAD ERROR" in positions 90-99. The specific load errors detected are:

- (a) Attempt to load program into a location above Y000(40K), H&00(60K), Y&00(80K), H-00(100K), Y-00(120K), H"00(140K), or Y"00(160K). The two leftmost characters of the A Address are Y0(40K), H&(60K), Y&(80K), H-(100K), Y-(120K), H"(140K), or Y"(160K).
- (b) Float digit for A address is greater than 2.
- (c) Float digit for B address is greater than 2.
- (d) Column 1 of input data contains an illegal character.
- (e) Card format is incorrect.
- (f) All functions required by the object program have not been loaded. The two leftmost characters of the A Address are Z0(40K), I&(60K), Z&(80K), I-(100K), Z-(120K), I"(140K), Z"(160K).

3. Detected by Input-Output Routines at object time

Errors occurring in the object program input-output routines stop the computer with the type of error indicated by the A address.

3301 FORTRAN II SYSTEM (Cont'd)

A ADDRESS	ERROR
0001	Input-output unit value is outside proper range.
0002	The printer has been specified for an input statement.
0003	Either a physical record read from tape exceeds the maximum size, or the tape record is not in the proper format; i.e., the first character of the block is greater than one.
0004	Record size specified by FORMAT statement exceeds maximum allowed.
0005	Illegal non-numeric character in input data.
0007	Element of a FORMAT statement was not followed by a comma, slash, or right parenthesis.
0008	Output routine failed attempting to round an integer variable. This error is caused by applying an R or F FORMAT element to an integer variable.

B. INTERRUPT ROUTINE

This section describes the functions of the 3301 FORTRAN interrupt routine. This routine is always in memory during a FORTRAN run and occupies locations 0010-0199, 0250-0339 and the upmost 100 locations of the memory specified in the SYSTEM control statement.

Upon entering an interrupt routine, the general or real-time F register is saved according to the type of interrupt. The routine then scans the interrupt indicators, and for indicators 1-7, 10, 12-15, and 18, types out the interrupt number, the location of the interrupt, and the last instruction executed. The interrupt routine then halts at location 0490.

For interrupt indicators 13 and 14, an additional line is first typed out showing the last I/O instruction executed in the appropriate sinmode. An exception occurs, however, if the interrupt was with reference to a magnetic tape and either an SP/SD, an A/B Equality condition without a GEP, or a parity error or vice occurred. In these situations, control is returned to the interrupted program without any typed messages or halts.

On interrupt indicator 11, General Interrupt F is loaded with the saved F-Register setting less ten. Control is then returned to the interrupted program, thus causing the program to loop until the device causing interrupt 11 is free or made operable.

APPENDIX J

3301 FORTRAN II SYSTEM (Cont'd)

For interrupt indicators 8, 9, 16 and 17 control is simply returned to the interrupted program.

C. SYSTEM RESTRICTIONS

1. The Card and Paper Tape Loaders described in Section XII of the 301 FORTRAN System Manual are not available.
2. Machine code subprograms must be in 301 loader format. These programs must operate under control of the 3301 FORTRAN interrupt routine.

The 304/305 FORTRAN interpreter has been extended to allow execution of all 3301 instructions except the following that are simulated or considered illegal by the interpreter: (Refer to Appendix F of the 301 FORTRAN Systems Manual.)

- (a) All instructions using the high-speed arithmetic unit
 - (b) Tally
 - (c) Conditional Transfer of Control
 - (d) Store Register
 - (e) Repeat
3. Object programs are floated to location 5500 plus the size of common storage.
 4. The contents of locations 0760-0767 are printed following the word DATE on each page of the compiler output.

APPENDIX K

20K 3301 COMPATIBILITY OPERATING SYSTEM

A special version of the 3301 Operating System is available which permits the execution of 20K 301 programs in a 40K 3301 processor, and 40K 301 programs in a 60K 3301 processor. This version (OSC series) does not permit execution of 3301 processes. A special set of operating procedures must be used with this version of the Operating System. Appendix K contains the complete operating procedures.

<u>Index</u>	<u>Page</u>
System Initiation.....	K-2
Operating System Typeouts.....	K-3
Error Recovery Typeouts.....	K-6
Console Routines.....	K-14
301 Compatibility Operating Procedures.....	K-33
301 Compatibility Typeouts.....	K-37

I. SYSTEMS PROCEDURES

A. SYSTEM INITIATION

The following procedure must be followed in order to load the Operating System into memory:

1. Mount the Operating System Tape on trunk 6.
2. Depress the LOAD TAPE button. When the STOP button is illuminated, depress the START button.
3. A typeout will be executed to the Console Typewriter requesting the date.

format: "DATE"

response: MMDDYY

After the response is typed, depress the RELEASE button.

4. STOP will be illuminated, then depress START button followed by REQUEST. The READY light will be illuminated.
5. The Operating System is loaded. The operator may initiate a process or do any of the Console routines.

B. LOADING OPERATING SYSTEM FROM OTHER THAN TRUNK 6

The following procedure loads the systems tape into memory when trunk 6 is not available:

1. Mount the Official Systems Tape on any tape station.
2. Depress GEN RES, then depress LOAD CONSOLE and type the following when the READY light is illuminated:

4X000000280..

where X = tape station where system tape is mounted.

Depress RELEASE. The first block on the system tape will be loaded into memory.

3. Depress GEN RES then LOAD CONSOLE and type the following when the READY light is illuminated:

V0X

where X = tape station where system tape is mounted.

Depress RELEASE, then set P Register to 0010 and depress START twice.

B. LOADING OPERATING SYSTEM FROM OTHER THAN TRUNK 6 (Cont'd)

4. Continue at System Initiation procedures starting at A. 3. above.

Halts encountered during the system initiation and operator actions are as follows:

"B" ADDRESS	MEANING	ACTION
0001	Normal	Depress START (First halt after LOAD TAPE)
0002	Error on "DATE" Typeout.	Reinitialize. If error occurs again, problem is with typewriter.
0003	System Tape Assignment invalid.	Restart.
0004	System Error during bootstrap.	Restart.
0005	Normal	Depress START (after system load completed).
0006	Read Error during bootstrap.	Restart.

C. OPERATING SYSTEM TYPEOUTS

Following is a table containing all the typeouts, error and normal, associated with the Operating System. (ECS and FCP)

MESSAGE	MEANING	OPERATOR ACTION
PROCESS		
.0 XXXX 0055	Contiguous process, first segment, insufficient memory.	None. Process terminates.
.0 0000 1001	1. Indicates that a device sequence was busy before an ISSUE was executed. (Meaning a FREEDV was not given after the last ISSUE.)	Take necessary registers and memory dumps. Correct condition and restart process.

(Cont'd)

MESSAGE	MEANING	OPERATOR ACTION
.Ø ØØØØ 1ØØ1 (Cont'd)	2. Device not present.	} Take necessary registers and memory dumps. Correct condition and re-start process.
.Ø ØØØØ 112Ø	Nonrecoverable tape error occurred while reading or writing tape.	
.Ø ØØØØ 1131	A nonrecoverable error while writing the Beginning Tape Label or E/F on an output file has occurred.	Continue will cause the tape to be rewound and the write to be retried.
.Ø ØØØØ 12Ø9	Abnormal termination on rewind.	} Type in Ø2 and depress RELEASE to retry.
.Ø ØØØØ 121Ø	Same as above.	
.Ø ØØØØ 1222	EI not located in block area.	Type in Ø2 and depress RELEASE to continue.
.Ø ØØØØ 123Ø	Same as .Ø ØØØØ 12Ø9.	Same as . Ø ØØØØ 12Ø9.
.Ø ØØØØ &BØ1	Nonrecoverable read error during segment loading.	None. Restart the process.
.Ø GØØ3 GØØ3	Process has terminated.	None - E.O.J.
.Ø XXXX T111	Requested segment not on MLT.	None
.Ø XXXX T222	Nonrecoverable error on MLT.	None
.Ø XXXX T333	Invalid device code for user's MLT.	None
.Ø XXXX T444	Nonrecoverable error when reading user's segment ID or Seg. Description.	None
.Ø XXXX T555	Nonrecoverable error trying to read System Tape.	None

(Cont'd)

MESSAGE	MEANING	OPERATOR ACTION
.Ø XXXX T666	Nonrecoverable error trying to read System Tape.	None
.Ø INVL_ID	ID of the Segment called for is not on the tape.	None. Process terminated.
.Ø INVL_REQ	Request for an Operating System overlay has improper format.	None. Operating System at fault.
.Ø MLT_FLT	Nonrecoverable error has occurred on user's MLT or System Tape.	None. Restart the process.
PROCESS **SE_ID_ADDRESS 1	A systems error within the indicated process has occurred at the location specified by Address 1.	Control is given to the operator via the Console Typewriter. The user indicates procedures. If the process ID is OPSYS, this indicates an error occurred in the operating system.
PROCESS **OE_ID_ADDRESS 1	An overflow within the indicated process has occurred at the location specified by Address 1.	
PROCESS **AE_ID_ADDRESS 1	An arithmetic error within the indicated process has occurred at the location specified by Address 1.	

Conditions can occur which will cause the computer to come to a machine halt, with no timeout appearing on the Console Typewriter. The B Register on the Maintenance Console contains a specific address which will identify the error condition. The B Register addresses and the errors associated with them are listed on the following page.

HALT	MEANING	OPERATOR ACTION
..0000&C01	Illegal PIN encountered or interrupt bit #3, or interrupt #11.	Refer user to his Interrupt Region.
..00001020	Console Typewriter is inoperable.	Correct the condition causing error. Depress START to continue.

D. ERROR RECOVERY MESSAGE

MESSAGE	MEANING	ACTION
1. Magnetic Tape Stations 581, 582, 681 and 3485 (RCA Mode).		
ERREC 1 TAPE y	DNF occurred while a Read instruction was in execution.	File Processing halt .0 0000 1120 will occur. Device Processing control will be returned to Name 2 of the FREEDV macro.
ERREC 2 TAPE y	DNF occurred at the initiation of a Read instruction.	Type 1 to retry, type 2 to return control to Name 2 of the FREEDV macro.
ERREC 3 TAPE y	Read parity error which Rollback routine failed to recover.	Type 1 to retry 20 times. Type 2 to return control to Name 2 of FREEDV macro.
ERREC 4 TAPE y	Tape station has gone inoperable upon initiation of a Read instruction.	Type 1 to retry. Type 2 to return control to user: File Processing halt .0 0000 1120 will occur. Device Processing control will be given to Name 2 of the FREEDV macro.
ERREC 5 TAPE y	Tape station has gone inoperable during execution of a Read instruction.	Control will be returned to the user: File Processing halt .0 0000 1120 will occur. Device Processing control will be returned to Name 2 of the FREEDV macro.
ERREC 6 TAPE y	Tape station y has gone inoperable upon initiation of a Write instruction	Type 1 to retry. Type 2 to return control to the user: File Processing halt .0 0000 1120 will occur. Device Processing control will be given to Name 2 of FREEDV macro.

(Cont'd.)

MESSAGE	MEANING	ACTION
ERREC 7 TAPE y	Tape station y has gone inoperable during execution of a Write instruction.	Control will be returned to the user: File Processing halt .0 0000 1120 will occur. Device Processing control will be given to Name 2 of the FREEDV macro.
ERREC 8 TAPE y	A write parity error has occurred.	None required. Timeout indicates at least 50 RAW alarms have occurred in writing to tape station y.
ERREC 9 TAPE y	A write parity error has occurred in writing to tape station y; Rollback counter is exhausted.	Type 1 to retry 20 times (Rollback). Type 2 to return control to the user: File Processing halt .0 0000 1120 will occur. Device Processing - control will be returned to Name 2 of the FREEDV macro.
ERREC 10 TAPE y	A DNF has occurred to station y during execution of a Write instruction.	Insert Write Enable ring if missing, and type 1 to continue; otherwise, type 2 to return control to the user: File Processing halt .0 0000 1120 will occur. Device Processing control will be returned to Name 2 of the FREEDV macro.
ERREC 11 TAPE y	A DNF has occurred to station y at the initiation of a Write instruction.	If the tape is not positioned at its physical end, type 1 to retry the I/O command. If the tape is positioned at its physical end, type a 2 to give control to the user: File Processing halt .0 0000 1120 will occur. Device Processing control is given to Name 2 of the FREEDV macro.
ERREC_12_TAPE_Y	Magnetic tape alarm.	None required. When process is terminated, tape and/or station should be checked for trouble.
ERREC_13_TAPE_Y	Parity error. Noise block on 3485 station in IBM mode.	Type 1 to read next block. Type 2 to return to Name 2 of FREEDV.
ERREC_14_TAPE_Y	Leading guard character (582/681/3485 RCA mode) missing from tape record. No information transferred into memory.	Type 1 to reread the block. Type 2 to return to Name 2 of FREEDV. Type 3 to read the next block on tape.

(Cont'd)

MESSAGE	MEANING	ACTION
2. Printer		
ERREC 1 Printer y	A DNF alarm has occurred.	Type 1 to retry. Type 2 to give control to the user: File Processing - halt .Ø ØØØØ 112Ø will occur.
ERREC 2 Printer y	The printer is in an inoperable state.	Device Processing - control will be given to Name 2 of the FREEDV macro.
ERREC 3 Printer y	Low paper alarm.	Replenish paper supply and depress RELEASE to continue.
ERREC 4 Printer y	Parity Error has been detected on the previous line printed.	Type a 1 to cause the following printout: "PREVIOUS PRINT LINE CONTAINS PARITY ERROR"; control is then given to the user. Type a 2 to give control to the user without the special typeout: File Processing - halt .Ø ØØØØ 112Ø will occur. Device Processing - control will be given to Name 2 of the FREEDV macro.

MESSAGE	MEANING	ACTION
3. Card Reader		
ERREC 1 READER y nnnn	DNF alarm has occurred (nnnn=four-character address of read in area).	Type 1 to retry. Type 2 to give control to the user. File Processing - halt .Ø ØØØØ 112Ø will occur. Device Processing - control will be returned to Name 2 of the FREEDV macro.
ERREC 2 READER y nnnn	Card reader is inoperable (nnnn=four-character address of the read in area).	Type 1 to retry. Type 2 to give control to the user. File Processing - halt .Ø ØØØØ 112Ø will occur. Device Processing - control will be returned to Name 2 of the FREEDV macro.
ERREC 3 CARD READER y nnnn	A card has been rejected because of a photo diode-failure (nnnn=four-character address of the read-in area).	To retry, reload rejected card and type in a 1. To give control to the user, type a 2. File Processing - halt .Ø ØØØØ 112Ø will occur. Device Processing - control will be returned to Name 2 of the FREEDV macro.
ERREC 4 CARD READER y nnnn	A multipunch error has occurred causing a card to be rejected.	To retry, correct and reload card, and type in a 1. Type 2 to return control to the user. File Processing - halt .Ø ØØØØ 112Ø will occur. Device Processing - control is returned to Name 2 of the FREEDV macro.

(Cont'd)

MESSAGE	MEANING	ACTION
4. Card Punch		
ERREC1 Card Punch X	DNF at initiation	1. If this is the initial attempt to address the device and the punch is off, render the punch operable and type in a 1. 2. If the input hopper is empty or the output stacker is filled, correct the condition, clear the transport, remove the last card from the output stacker, and type in a 1. 3. If the inoperability is not caused by conditions 1 or 2, clear the punch transport of all cards: a. If five cards are rejected from the transport, render the punch operable and type in a 1. b. If four cards are rejected and the PCE indicator is lit on the control panel, render the punch operable and type in a 1. c. If four cards are rejected and the PCE indicator is <u>not</u> lit, remove the last card punched from the output stacker, render the punch operable, and type in a 1.
ERREC2 Card Punch X	DNF during execution	
ERREC3 Card Punch X	INOP at initiation	
ERREC4 Card Punch X	INOP during execution	
ERREC5 Card Punch X	Parity Error detected during punch execution. (Error Card sent to reject stacker)	No action on these messages, they occur only if user has not provided error recovery with a back-up area. Control will be returned to user's abnormal return address after typeout.
ERREC6 Card Punch X	Punch compare error detected during punch execution. (Two cards sent to reject stacker)	

(Cont'd)

MESSAGE	MEANING	ACTION
4. Card Punch (Cont'd)		
ERREC7 Card Punch X	Parity error or punch compare error occurred when 20 errors have been detected.	Type 1 to continue and no further typeouts will occur. Type 2 to return control to the user. In either case, have maintenance check card punch.
ERREC8 Card Punch X	INOP or DNF occurred during error recovery.	Same as for ERREC1.

MESSAGE	MEANING	ACTION
5. Paper Tape		
ERREC 1 PT {Reader Punch} y CMDA aaaa	DNF occurred at initiation.	See operator action listed below.
ERREC 2 PT {Reader Punch} y CMDA aaaa	DNF occurred during execution.	
ERREC 3 PT {Reader Punch} y CMDA aaaa	The device is inoperable at initiation.	
ERREC 4 PT {Reader Punch} y CMDA aaaa	The device has gone inoperable during execution.	
ERREC 5 PT {Reader Punch} y CMDA aaaa	A parity error has been detected.	
y = PT Reader or Punch device number.		
CMDA = "A" address into which record was read or from which record was punched.		

OPERATOR ACTION

The paper-tape user has six options available at time of error recovery:

- Type a 1 and error recovery will retry the I/O with the original "A" address. This would be the option to select if the error occurred at time of initiation.
- Type a 2 and error recovery will return to the user at the "B" address of the FREEDV.
- Type a 3 and error recovery will retry the I/O using the Final "A" address (from the abnormally terminated I/O) as the new I/O "A" address. Use this option when, during reading or punching, equipment fails and retry from the point of failure is desired. Be sure that "A" final, as contained in the error recovery type-out message, agrees with the last character actually read or punched by reading HSM and/or examining the paper tape. "A" final should contain an address one character to the right (or to the left when reading reverse) of the last character actually read or punched.

OPERATOR ACTION (Cont'd)

- d. Type a 4 nnnnnn and error recovery will display 80 characters of HSM starting with the six-character address nnnnnn. This option (as well as option No. e below) may be useful if an attempt is being made to recover from an I/O which failed during execution (see option No. c above).
- e. Type a 5 nnnnnn aaaaaaaaaa and error recovery will transfer into the six-character HSM address nnnnnn, the 10 characters aaaaaaaaaa (must specify 10 characters).
- f. Type a 6 and error recovery will return to the user at the normal return address. This option may be used, for example, when bad parity has been corrected in HSM and it is desired to continue as though there was no error.

II. RCA 3301 CONSOLE ROUTINES

All 3301 console routines are initiated by console requests. The console request requires the following procedure:

1. Depress the REQUEST button. A read is issued to the typewriter, and the READY light is illuminated.
2. Type in request. If an error is made, depress the CANCEL button, and type in the request again.
3. Depress the RELEASE button. The request is serviced. At this time, the operator may issue another read to the typewriter, except in the following two cases:
 - a. Initiate and Execute. If the request was for process initiation with continuous execution, control will be given to the Operating System.
 - b. Continue. If the request was for continuation of an initiated process, control will be given to the Operating System until the next requested interruption.

Each request consists of a two-character code followed by the parameter information necessary to each routine. Since all processes are floatable, each request requires enough qualification to determine which process, segment, or sequence is being referenced.

Some console routines may require lengthy parameters to be typed. In order to save time and minimize errors, a provision has been made to accept calls for these routines from cards as well as the Console Typewriter. The user must specify which device he is using by an Accept Patches request on the typewriter.

RCA 3301 CONSOLE ROUTINES

<u>Call Code</u>	<u>Console Routines Title of Routine</u>	<u>Page No.</u>
01	Initiate	K-15
02	Continue	K-16
05	Execute 301 Function	K-17
08	Display HSM	K-19
12	Segment Memory Patch	K-20
13	Open Diagnostic Device	K-25
14	Tape Edit	K-26
17	Memory Dump	K-27
20	Close Diagnostic/Write Sentinel	K-28

01 - INITIATE

General Description

The Initiate call starts a 301 program. The format is 01_301. Execution of this routine causes the compatibility program to be loaded and transfers control to it.

02 - CONTINUE

General Description

The Continue function allows a suspended process to resume execution.

Format

$$02 \left\{ \begin{array}{l} \text{Process} \\ \text{-- ID} \quad \text{--SQ_address} \end{array} \right\}$$

where 02 = Continue call number

Process ID = five-character Process ID

SQ = sequence ID of sequence from which to continue if process is to be continued at other than the point of interrupt.

address = six-character address relative to the start of the sequence.

To continue at the point of interrupt, the format is as follows:

02

05 - EXECUTE 301 FUNCTION

General Description

This routine permits the user to perform 301 operator instructions only when Compatibility is in memory. If not present, the request will be rejected.

Execute 301 Instruction

Format

05_ONAAAABBBB

where 05 = call number

O = 301 Operation code

N = 301 "N" character

AAAA = "A" Address

BBBB = "B" Address

Set 301 Register

Format

05R_XXXX

where 05 = call number

R = P, A, or B register

XXXX = value to store in the register

This routine will only set the register. To continue, the 02 Continue routine must be issued.

Terminate 301

Format

05STOP

should be typed in at completion of 301 task only.

Initiate Loader

Format

05I

produces skeleton loader into 301 memory at 0260 and transfers control to 0260 to read 301 loader deck or execute cards.

Display 301 Registers

Format

05REGS

where 05 = call number

REGS causes compatibility to display the register settings of P, A, B, STA, and STP.

08 - DISPLAY HSM

General Description

This routine will display on the Console Typewriter the contents of the memory area specified. The display may consist of any number of consecutive addresses, decades, or instructions within the same sequence, and may be in one of three formats:

- 1) Instruction. This format will be displayed as:

ON_a-address_b-address

The addresses will consist of a six-character absolute memory address, and a one-character address modifier, if applicable. If there is no address modification, a space will be typed.

- 2) Address. Each group of four consecutive characters will be displayed as a six-character absolute memory address, and a one-character address modifier, if applicable.
- 3) Data. This format will type out the data as it appears in memory.

Format Option 1

$$08 \begin{Bmatrix} D \\ I \\ A \end{Bmatrix} \text{procseq_sq_address1} \left[\ominus \text{address2} \right]$$

where 08 = Display HSM call number

D = display in data format

I = display in instruction format

A = display in address format

procseq = seven-character, process-segment ID

sq = two-character sequence ID

address1 = six-character relative address of first location of display

address2 = six-character relative address of last location of display

Format Option 2 - to display actual machine locations.

$$08 \begin{Bmatrix} D \\ I \\ A \end{Bmatrix} \text{_address1} \left[\ominus \text{address2} \right]$$

12 - SEGMENT MEMORY PATCH

The patch routines replace the contents of relative memory locations with the addresses, instructions, or characters specified by the user. The end of patches is signaled by a message containing the characters ED in positions 1 and 2 followed by 78 blank columns or positions.

Patches may be applied in either relative or absolute formats.

A. RELATIVE PATCHING

The patches must specify the format, process, segment, sequence, and relative location to be patched. The format may be one of three:

1. Data Patch

Memory will be replaced with the exact characters specified, with a maximum of 50 characters per message. Normally, the end of the patch will be signaled by the last nonspace character. If, therefore, the last character of the message is a space, it must be followed by a colon to signal the end of the message. If the last character of a patch is a colon, it must be followed by another colon. If the patch consists of more than 50 consecutive characters, it can be continued by placing a comma in the 51st data position of the message. (The 51st position may be used only for a comma or a colon.) Following is the format, including the card columns:

Columns

1-2	call number (12)
3	format (D)
4-10	seven-character, process-segment ID
11	space
12-13	sequence ID of patch
14	space
15-20	six-character relative address of patch
21	space
*22-71	any 3301 characters
*72	space, comma, or colon
73-80	any identification

* cols. 22-72 are used for continuation cards where more than one card is required for a patch.

2. Instruction Patch

This format will cause the contents of sequence-relative addresses to be replaced in memory. A message may contain a maximum of two consecutive instructions, separated by a comma. Any number of consecutive instructions may be patched, as long as a comma follows each instruction, and only two are issued per message. The last consecutive instruction should not be followed by a comma. The format, including card columns, is:

Columns

1-2	call number (12)
3	format (I)
4-10	seven-character process-segment ID
11	space
12-13	sequence ID of patch
14	space
15-20	six-character relative address of patch
21	space
*22-23	ON operation code and N-character
24	space
25-26	sequence ID of A-address
27	space
28-33	six-character relative A-address
34	address modifier 1,2,3, or space
35	space
36-37	sequence ID of a B-address
38	space
39-44	six-character relative B-address
45	address modifier 1,2,3, or space
46	space, or comma if more <u>consecutive</u> instructions follow
47-48	ON operation code and N-character of second consecutive instruction
49	space
50-51	sequence ID of A-address
52	space
53-58	six-character relative A-address
59	address modifier 1,2,3 or space
60	space
61-62	sequence ID of a B-address
63	space
64-69	six-character relative B-address
70	address modifier 1,2,3, or space
71	space, or comma if more <u>consecutive</u> instructions follow
72	space
73-80	any identification

* cols. 22-71 are used for continuation cards, where desired.

3. ADDRESS PATCH

This format will cause the contents of sequence relative addresses to be replaced by one or more four-character addresses. A message may contain from one to four consecutive addresses, separated by commas. Any number of consecutive addresses may be patched, as long as a comma follows each address, and only four are issued per message. The last consecutive address should not be followed by a comma. The format, including card columns, is:

Columns

1-2	call number (12)
3	format (A)
4-10	seven-character process-segment ID
11	space
12-13	sequence ID of patch

Column (Cont'd)

14	space
15-20	six-character relative address of patch
21	space
*22-23	sequence ID of first address
24	space
25-30	six-character relative address
31	address modifier 1,2,3, or space
32	space, or comma if more <u>consecutive</u> addresses follow
33-34	sequence ID of a second address
35	space
36-41	six-character relative address
42	address modifier 1,2,3, or space
43	space, or comma if more <u>consecutive</u> addresses follow
44-45	sequence ID of third address
46	space
47-52	six-character relative address
53	address modifier 1,2,3, or space
54	space, or comma if more <u>consecutive</u> addresses follow
55-56	sequence ID of fourth address
57	space
58-63	six-character relative address
64	address modifier 1,2,3, or space
65	space, or comma if more <u>consecutive</u> addresses follow in next message
66-72	spaces
73-80	any identification

* cols. 22-65 are used for continuation cards where desired.

B. ABSOLUTE MEMORY PATCH

The patch routine will alter absolute memory locations in date, instruction, or address formats. These formats are available through the Console Typewriter or the card reader. This patch routine must be preceded by the 04 Accept Patches console routine and terminated by an E/D card, when patches are to be applied from cards.

1. Data Punch

Memory will be replaced with the exact characters specified with a maximum of 50 characters per message. Normally, the end of the patch will be signaled by the last nonspace character. Therefore, if the last character of the message is a space, it must be followed by a colon to signal the end of the message. If the last character of a patch is a colon, it must be followed by another colon. If the patch consists of more than 50 consecutive characters, it may be continued by placing a comma in the 51st data position of the message. (The 51st position may be used only for a comma or a colon.) Following is the format including the card columns:

Columns

1-2	call number (12)
3	format (D)
4	space
5-10	six-character address to be patched
11	space
*12-71	any 3301 characters
72	space, comma or colon
73-80	any identification

* cols. 12-72 are used for continuation cards where more than one card is required for a patch.

2. Instruction Patch

Any number of consecutive instructions may be patched as long as a comma follows each instruction, and only three are issued per message. The last consecutive instruction should not be followed by a comma. The format including the card columns follows:

Columns

1-2	call number (12)
3	format (I)
4	space
5-10	six-character address to be patched
11	space
*12-13	ON operation code and N character
14	space
15-20	A-address
21	address modifier, 1,2,3, or space
22	space
23-28	B-address
29	address modifier 1,2,3, or space
30	space or comma
31-32	ON operation code and N character
33	space
34-39	A-address
40	address modifier 1,2,3, or space
41	space
42-47	B-address
48	address modifier 1,2,3, or space
49	space or comma
50-51	ON operation code and N character
52	space
53-58	A-address
59	address modifier 1,2,3, or space
60	space
61-66	B-address
67	address modifier 1,2,3, or space
68	space or comma
69-72	spaces
73-80	any identification

* Columns 12-68 are used for continuation cards where necessary.

3. Address Patch

A message may contain a maximum of seven consecutive addresses separated by commas. Any number of consecutive addresses may be patched as long as a comma follows each address and only seven are issued per message. The last consecutive address should not be followed by a comma. The format including the card columns follows:

Columns

1-2	call number (12)
3	format (A)
4	space
5-10	six-character address to be patched
11	space
*12-17	address 1
18	address modifier 1,2,3, or space
19	space or comma
20-25	address 2
26	address modifier 1,2,3, or space
27	space or comma
28-33	address 3
34	address modifier 1,2,3, or space
35	space or comma
36-41	address 4
42	address modifier 1,2,3, or space
43	space or comma
44-49	address 5
50	address modifier 1,2,3, or space
51	space or comma
52-57	address 6
58	address modifier 1,2,3, or space
59	space or comma
60-65	address 7
66	address modifier 1,2,3, or space
67	space or comma
68-72	spaces
73-80	any identification

* Columns 12-72 are used for continuation cards where more than one card is required for a patch.

13 - OPEN DIAGNOSTIC DEVICE

General Description

This routine causes a designated device to receive the output of debugging routines, such as memory dumps and tape edits. All debugging routines requested will use this output device.

Format

13_NP

where 13 = Open Diagnostic call number

N = actual device number

P = prime character, or zero if prime character not required.

See Appendix C for device priming details.

14 - TAPE EDIT

General Description

This routine edits the contents of an entire tape or a selected file to the printer or to a tape for off-line printing. The input medium may be magnetic tape, paper tape, or cards.

Format

$$14 \left\{ \begin{array}{c} R \\ - \end{array} \right\} NP_ [FF]$$

where 14 = Tape Edit call number

R = rewind input tape

- = do not rewind input tape

N = actual device number

P = prime character, or space if prime character not required*

FF = nth file of the tape. Multifile reels must adhere to FCP multifile conventions.

* See Appendix C for device priming codes.

Note: The maximum block size is 20,000 characters with the read-in area starting at 10,000.

17 - MEMORY DUMP

General Description

This routine will edit an entire application to the printer. The edit will contain the stored interrupt registers, including the three Index registers and increments. The edit may be in data and/or instruction format. The user must give the process ID of the process to be dumped. The user may get a dump of the entire memory by omitting the process ID. In this case the actual micromagnetic memory registers will be printed. For examples see Appendix I.

Format

Option 1:

$$17 \left\{ \begin{array}{c} D \\ I \\ B \end{array} \right\} \text{ Process ID}$$

where 17 = Memory Dump call number

D = data format

I = instruction format

B = instruction and data format

Process ID = five-character process ID

Format

Option 2: (to dump actual machine locations)

$$17 \left\{ \begin{array}{c} D \\ I \\ B \end{array} \right\} \text{_address 1 _address 2}$$

where address 1 = six-character address of lower limit

address 2 = six-character address of upper limit

20 - CLOSE DIAGNOSTIC/WRITE SENTINEL

General Description

This routine will close the diagnostic device and rewind it to BTL, or it will enable the operator to write sentinels to tape (EF, ED, or EF/ED).

Close Diagnostic

Format

20
where 20 = Close Diagnostic call number

Write Sentinel

Format

20 $\left\{ \begin{array}{c} F \\ D \\ B \end{array} \right\}$ NP, NP, NP

where 20 = Write Sentinel call number

F = write EF } No Rewind
D = write ED }

B = write EF/ED and rewind tapes

N = actual device number

P = priming code or zero (Appendix C)

If more than one tape unit is requested, each must be followed by a comma except the last, which must not be followed by a comma. A maximum of 10 devices are acceptable.

B. CONSOLE ROUTINE TYPEOUTS - ERROR and NORMAL

Listed below are the typeouts associated with the 3301 console routines. With the exception of four, they are all error messages indicating an error in the previously issued console routines. Meanings and actions accompany each message.

MESSAGE	MEANING	OPERATOR ACTION
E 1	The requested PROC/SG ID cannot be found. The request is rejected.	Reissue the console routine with correct PROC/SG ID.
E 2	The requested SQ associated with a PROC/SG ID cannot be found. The request is rejected.	Reissue the console routine with the correct SQ number.
E 3	The requested process cannot be found. The request is rejected.	Reissue the console routine with the correct process ID.
E 4	User attempted to set the "P" register. The request is rejected.	This is an illegal request. Reissue the console routine with the correct register.
E 5	Memory Dump has terminated.	Normal typeout.
E 6	An error was detected trying to service Stop, Snap or Patch. The error exists in the format on the sequence associated with the PROC/SG ID. The first 19 characters of the request are appended to the message.	Reissue the console routine with the correct PROC/SG ID.
E 8	A nonrecoverable error has been detected trying to OPEN or CLOSE a diagnostic device. The actual device number and the six-character device status are appended to the message. Refer to the FCP Test Device Characters ABCDEF for device status.	None. The routine is terminated. Error recovery has been attempted and failed. The routine may be reissued if desired.
E 9	A card-read error has been detected.	To terminate the routine, type in a Z and depress the RELEASE button. To continue the routine, replace the card in error, type a "C", and depress the RELEASE button.

B. CONSOLE ROUTINE TYPEOUTS - ERROR and NORMAL (Cont'd)

MESSAGE	MEANING	OPERATOR ACTION
E ₁₀	A parity error has been detected from the printer.	To terminate the routine, type in a Z and depress the RELEASE button. To continue, type in a C and depress the RELEASE button.
E ₁₁	A nonrecoverable error on the output device of this routine has been encountered.	None. The run has been terminated.
E ₁₂	A nonrecoverable error on the input device of this routine has been encountered.	None. The run has been terminated.
E ₁₃	Low paper supply has been detected from the on-line printer.	Replenish paper supply. Type in a C and depress the RELEASE button to continue.
E ₁₄	An E/D has been detected on the input file, or an E/F has been detected for the selected file.	None. This signifies the end of the tape edit.
E ₁₅	An error has been detected trying to rewind the input tape of the routine. (The routine is terminated when the error is detected.)	None. The run has been terminated.
E ₁₆	An 04 has been issued with an invalid third character (must be C, P, T, or M).	None. The request is rejected.
E ₁₇	Not enough room to store parameters. The message typed out has been rejected. All other messages will be applied.	None. When existing messages have been applied, the READY light will come on and code 12 patches may then be applied.
E21_XX	Invalid Op. RTN._OPCODE has been ignored.	Type in valid Op. code.
E22	PIN occurred while Op. RTNs. were executing.	None. The initiated Op. RTN. has been destroyed.
E24	05 issued with compatibility not in memory.	None. The request is rejected.

B. CONSOLE ROUTINE TYPEOUTS - ERROR and NORMAL (Cont'd)

MESSAGE	MEANING	OPERATOR ACTION
E ₂₅	Software switch is busy.	To reset software switch and continue Op. RTN, type in "C" and release. To cancel Op. RTN., type in "Z". The "READY" light will come on and 02 may be issued.
E ₂₆	Write EF/ED request issued with an invalid third character (must be D, F, or B).	None. The request is rejected.
E ₂₇	User attempted to close a diagnostic device but no device is open.	None. The request is rejected.
DEV ASSIGNED	Diagnostic device to be opened is assigned.	Type "S" to open device type "NP"* to open different device. *N = actual device number P = prime character or 0 (zero)
PURGE DATE XXXXXX	User attempted to open a diagnostic tape on which the purge date (XXXXXX) is later than current date.	None. The request is rejected.
DEV N OPENED	User attempted to open a diagnostic device before device N had been closed.	Type "S" to keep device opened Type "C" to close device.
DEV N INOP	The diagnostic device chosen to be opened is inoperable.	None. The request is rejected.
DEV NOT FOUND	User attempted to open an invalid diagnostic device.	None. The request is rejected.

III. 301 COMPATIBILITY

A. General

1. 301 programs are run on the RCA 3301 in the same manner as on the RCA 301.
2. Programs may be presented on the same medium as they were on the RCA 301 (cards, paper tape, magnetic tape).
3. 301 Compatibility does not initialize the memory for the 301 programs (i.e., Print table or Sum and Difference tables).

B. 301 Program Operating Aids

The RCA 3301 Console routines initiate and run the 301 program.

1. Initiate 301 (Console routine 01).
2. Console routine "05".
 - a. Execute 301 instruction - 05_ONAAAABBBB
 - b. Set 301 Register 05R_XXXX - R equals P, A, or B.

If the 05P is used to set "P" the continue "02" Console routine must be used to start the 301 program.
 - c. Terminate 301 Compatibility 05STOP
 - d. Initiate loader 05I sets up dummy bootstrap and issues a card-read instruction.
 - e. 301 Register Display 05REGS.
3. Device table and memory size are preset for user. If it is desired to change, parameters are available which may be used at object time.

C. 301 Environment Parameters

The following parameters provide the user with the facility to alter standard memory size (from 40K) or to vary device pre-assignments:

1. The letter "M" is the constant that specifies memory size.

$$\text{FORMAT} - M - \begin{cases} 10 \\ 20 \\ 40 \end{cases}$$

where M = constant for compatibility
10 designates a 10K memory
20 designates a 20K memory
40 designates a 40K memory
example - M-20 designating a 20K 301 Memory

C. 301 Environment Parameters (Cont'd)

2. The letter "A" is the constant that assigns devices.

FORMAT - An (t), dp

where A = constant for compatibility
n = 301 device to be assigned to a 3301 device
(t) = 301 device type; if not required omit
 (t = B for Binary card read)
 (t = 5 for 335 model printer)
, = is used for readability; must be in statement
d = 3301 device to be assigned
(p) = priming code for 3301 device assigned

Figure in (t) is optional, enter only if necessary.

Examples

- 1) A75,Q assign 301 printer "7" type 335 to 3301 printer "Q"
- 2) A1,1 assign 301 tape station 1 to 3301 tape station 1

3. The letter "C" changes a device assignment made in error or changes device assignment for use by a subsequent 301 program, etc.

FORMAT - Cnt,dp

where C = constant for compatibility
nt,dp = these items are the same as in the ASSIGN parameter

4. Use the following parameter to specify print buffer loading:
- a. PR1 - Load buffer once only.*
 - b. PR2 - Load buffer every time.

In response to these parameters there are two informative messages confirming same if parameters are read in from a device other than the Console Typewriter:

- a. "LOAD_PRINT_BUFFER_ONCE_ONLY."
- b. "LOAD_PRINT_BUFFER_EVERY_TIME."

PR2 parameter is necessary for 301 programs that alter the print table during operation.

*If no parameter is entered this will be assumed.

C. 301 Environment Parameters (Cont'd)

5. If it is desired to change just memory size or change just one or two devices, this may be accomplished with the response of "CH" in response to the "MOUNT_301 ENVIRONMENT" message. In response to this parameter, a message will be typed out stating "MOUNT_CHANGES."

To alter preset table the change constant must be used.

6. To terminate parameters from any device other than the Console Typewriter the constant "END" must appear.

Format - END

To terminate all parameters whether from the input device or the Console Typewriter, the "02" Console routine must be issued before control can be resumed for proceeding with other routines.

These parameters may be prepared in advance on paper tape or punched cards; if on paper tape, each parameter must appear as a separate block; if on punched cards, one parameter per card starting in column one. If parameters are typed in by the Console Typewriter they must be typed one parameter per line and the RELEASE button depressed after each parameter is typed.

D. Standard Parameters Preset by Compatibility are:

1. 40K memory
2. 120 position printer and translate only card reader
3. Load print buffer once only
4. Standard device table

Not in IOS

301 DEVICE	3301 DEVICE	Ng	ACTUAL DEVICE
1	1	01	TRUNK 1
2	2	02	TRUNK 2
3	3	03	TRUNK 3
4	4	04	TRUNK 4
5	5	05	TRUNK 5
6	_Space	12	TRUNK _Space
A	9	11	TRUNK 9
(	-Minus	40	CARD READER
7	Q	50	PRINTER
)	M	44	CARD PUNCH
8	K	42	PAPER TAPE READER
9	_	46	PAPER TAPE PUNCH

The 301 monitor printer and interrogating typewriter do not require table entries. They are assigned automatically to the Console Typewriter.

E. Device Substitution

The following table shows the allowable 301/3301 device type substitution.

301 DEVICE	3301 DEVICE					
	CARD READER	CARD PUNCH	PAPER TAPE READER	PAPER TAPE PUNCH	PRINTER	MAGNETIC TAPE
Card Reader	X		X			X
Card Punch		X		X		X
Paper Tape Reader			X			X
Paper Tape Punch				X		X
Printer					X	X
Magnetic Tape						X

F. Operating Procedures

1. Initiate the System (see page K-2).
2. When the READY light is illuminated, issue the Initiate console routine using the following format:

01_301
3. Upon the typeout "MOUNT_301_ENVIRONMENT", the response of the operator will cause one of the following:
 - a. Accept standard memory size and device table,
 - b. change memory size or one or two devices, or
 - c. change the complete standard table.
4. To accept standard memory size and device tables, type "02" and depress RELEASE.
5. Environment parameters may be typed in at the Console or they may be read in from other devices (paper tape, cards, or magnetic tape) if the operator types the following message:

R_dp or RQdp

where: R = read parameters
Q = omit informative typeouts (see Typeouts)
 d = device containing parameters
 p = priming code

6. After all device substitutions are made, a response of "02" is required by the operator to terminate the Environment routine. At this point 301 operations may be performed with the use of the "05" console operator's routine. When the Environment routine is terminated, it is not possible for any further assignments to be made.

F. Operating Procedures (Cont'd)

7. Follow timeouts and 301 operating procedures.

Typeouts - Normal and Error

MESSAGE	MEANING	ACTION
301_n_ASSIGNED_3301_dp	301 device "n" has been assigned 3301 device "d" priming code "p".	Informative typeout. No action required.
3301_n_ASSIGNED_3301_dp._ WAS_ALREADY_ASSIGNED	3301 device already assigned to some other process.	Informative typeout. No action required.
301_DEVICE_CODE_ERROR: XX....X	Indication that 301 device code in displayed parameter did not pass validation.	Assignment has not been made. Correct parameter and re-apply.
301_DEVICE_TYPE_ERROR: XX....X	Indication that 301 device type code in displayed parameter did not pass validation.	Assignment has not been made. Correct parameter and reapply.
301_HALT_X_XXXX_XXXX AT_PPPP	301 halt has occurred at P setting.	301 halt, follow 301 operating procedures.
301_INSTRUCTION_IGNORED "ON"	An illegal 301 Operation code at PPPP has been encountered.	301 halt, follow 301 operating procedures.
301_MEMORY_XXR	Parameter validation of memory size. XX=10, 20 or 40K.	Informative typeout. No action required.
301_OVERFLOW_ERROR_AT_PPPP	Arithmetic overflow which would have been encountered on the 301.	301 error, follow 301 operating procedures. Any console routine may be executed. 02 will go on with 301.
3301_DEVICE_CODE_ERROR: XX...X	Indication that 3301 device code in displayed parameter did not pass validation.	Assignment has not been made. Correct parameter and reapply.
ABNORMAL_RETURN	Indication of abnormal return in reading parameters from an input device.	Retry.
BINARY_CARD_READ_ATTEMPTED_ AT_PPPP XXXXXXXXXX	Binary card read attempted although not specified in initial parameters.	If binary card read is desired, start over and state this in parameters

(Cont'd)

Typeouts - Normal and Error (Cont'd)

MESSAGE	MEANING	ACTION
DEVICE_SUBSTITUTION_ERROR: _XX....X	Device substitution in displayed parameter did not pass validation; i.e. failed inter-changeability test.	Assignment has not been made. Correct parameter and reapply.
END_301_ASSIGNMENTS	Message indicating the last parameter has been read from input device.	Changes to parameters may be done at this point. If no changes, see operating procedures.
ERROR_NO_MATCH_FOR_CHANGE: XX....X	Parameter displayed did not pass validation. No match found for 301 device.	Original assignment not changed.
ERROR_ON_301_NORMAL I/O ON AAAABBBB	An I/O error condition occurred that was not corrected by FCP error recovery. Original 301 Addresses used for A and B. The Op. code may be different as it will be the 3301 operation code.	To ignore the error, type in "02" and depress RELEASE.
ERROR_ON_301_SIMO_I/O ON AAAA BBBB	An I/O error condition occurred that was not corrected by FCP error recovery. This error was not detected until another simo I/O was issued or a command was issued to the device on which the error occurred. A and B addresses are original 301. The Op. code may be the 3301 operation code.	To ignore the error, type in "02" and depress RELEASE.
HSM_PARAMETER_ERROR_XX... X	Parameter displayed did not pass validation.	Correct and reapply.
MOUNT_301_ENVIRONMENT	Typed out when Compatibility is initiated.	Response from operator. See operating procedures, page K-32.

(Cont'd)

Typeouts - Normal and Error (Cont'd)

PA

MESSAGE	MEANING	ACTION
PARAMETER_ERROR: XX....X	Input parameter displayed could not be decoded. If from some device, the operation is terminated.	Correct parameter and reapply from Console Typewriter; follow instruction page K-32 to continue reading parameters from other than Console Typewriter.
PRIMING_CODE_ERROR: XX...X	Input parameter displayed (the 3301 priming code) did not pass validation.	Informative typeout. Assignment has not been made, correct and reapply.
.OTOO_MANY	Attempt to generate too many device table entries.	Restart.

APPENDIX L

3301/1401 SIMULATOR

A. FUNCTION

The 3301/1401 Simulator routine is available to simulate programs written for 1401 card and tape systems of various memory sizes.

B. SPECIFICATIONS

See RCA 3301 Service Routine Library manual #94-30-002.

C. SIMULATOR SYSTEM INITIALIZATION

The following are the operating procedures for the 3301/1401 Simulator:

1. Type in: 01_R1401Snp9B

where: nn = the trunk # of the Service Library Tape containing 1401S.

p = the prime code of the trunk.

2. The following typeout occurs:

1401S ENTER PROCESS PARAMETERS

3. Type in: 21_400 (to read DEVPAR's if using tapes)

02

4. The device assignment table is typed out.

If any changes are to be made, type in changes.

02

5. The following typeouts occur:

1401S IBM 1401 SIMULATOR: TIME HH:MM:SS

1401S DUMP LOCATION LLLL; CNTRL MMMM

The time is HH hours, MM minutes, and SS seconds;

LLLL is the four-character 3301 memory address of the beginning of the special Simulator memory dump which edits simulated 1401 memory and MMMM is the four-character 3301 memory address of Simulator Control.

No halts occur.

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C. SIMULATOR SYSTEM INITIALIZATION (Cont'd)

6. The following three typeouts occur for each 1401 program being simulated, if control card number one is included:

a. 1401S SIMULATING nnK 1401 MEMORY

where nn is 04, 08, 12, or 16

b. 1401S SIMULATOR HAS DE-ALLOCATED UNREQUIRED MEMORY

If the Simulator is to rename itself the following typeout will occur:

c. 1401S SIMULATOR PROCESS RENAMED TO aaaaa

where aaaa is the new process identification.

If the print line shift option is included, the following typeout will occur:

1401S PRINT LINE SHIFTED $\left\{ \begin{array}{l} 00 \\ 10 \\ 20 \end{array} \right\}$

7. The following identifies the 1401 job:

1401S JOB xxxxx; TIME HH:MM:SS:

where xxxxx is the job identification.

8. If there are no device or clock checkpoint dumps to be taken, a typeout will occur:

1401S NO DEVICE CHECKPOINTS

1401S NO CLOCK CHECKPOINTS

D. CONTROL ROUTINE ENTRANCES

The Simulator Control routine may be entered as a result of the following:

1. When an invalid 1401 operation code is encountered the following typeout occurs:

1401S 1401 INSTRUCTION ERROR AT IIII O AAAA BBBB D;

TIME HH:MM:SS

where IIII = 1401 instruction register

O = 1401 operation register

AAAA = 1401 A-address register

BBBB = 1401 B-address register

CONTROL ROUTINE ENTRANCES (Cont'd)

D = 1401 D register

2. When a 1401 Halt instruction is encountered, the following typeout occurs:

1401S 1401 INSTRUCTION HALT AT IIII O AAAA BBBB D;

TIME HH:MM:SS

where IIII = 1401 instruction register

O = 1401 operation register

AAAA = 1401 A-address register

BBBB = 1401 B-address register

D = 1401 D register

3. When BP4 is turned ON, the 1401 program is interrupted at the termination of the 1401 instruction being simulated, and the typeout for 2 above occurs, with the word HALT replaced by STOP.

When the READY light comes on, 3301/1401 Simulator is in the Simulator Control routine.

CONTROL CARD FORMAT

There are three required control cards that must precede the first 1401 program. Control card number one is required only for the first 1401 program being simulated, and is optional for each succeeding program. Control cards number two and three are required for all programs being simulated.

The 3301/1401 Simulator will be loaded into the largest available block of 3301 memory. If no other process is currently in memory, the Simulator will fill all of memory. Control card number one informs the Simulator of the programmer's 1401 memory requirement. The Simulator requires, as its minimum, 3301 memory sufficient for a 4K simulation. Each additional 4K of 1401 memory that is required, requires an additional 8K of 3301 memory. If the 3301 memory that is required for the 1401 simulation is available, the Simulator will release all unrequired 3301 memory. If the installation requirement is a 16K 1401 simulation, then later is only 4K 1401 simulation, the unrequired 24K of 3301 memory may be deallocated when the first of the 4K 1401 programs is initialized. The programmer may not allocate memory. The function of this control is to release memory.

To facilitate multiprogramming of the Simulator, (the 3301 Operating System, and not the Simulator, handles multiprogramming) this control card also gives the programmer the ability to rename the Simulator process currently in memory. The Simulator is not permitted to rename itself %%%% or spaces. The five percent signs could be confused with the console typeouts from the 3301 Operating System.

E. CONTROL CARD FORMAT (Cont'd)

While running 1401 jobs it may be necessary to print on the extreme left side of the form. The 1403 printer allows more lateral movement of the paper than the printer on the 3301. To compensate for this, the programmer may shift the print line 10 or 20 spaces to the right. An entry of 00, or omitting this optional entry, will reset the print line to its normal beginning location. Although this control card is optional after the first 1401 job, this control card with this entry is required for each job that requires the print line to be shifted.

1. Control Card Number One

Cols. 1 - 17 1401_MEMORY_SIZE_

Cols. 18 - 20 $\left\{ \begin{array}{l} 04K \\ 08K \\ 12K \\ 16K \end{array} \right\}$

Cols. 26 - 40 RENAME_PROCESS_

Cols. 41 - 45 $\left\{ \begin{array}{l} \text{NO_ _ _} \\ (\text{name}) \end{array} \right\}$ if process is not to be renamed
if process is to be renamed.

The process name may not be five spaces or %%%%

Cols. 51 - 69 $\left[\begin{array}{l} \text{SHIFT_PRINT_LINE_} \end{array} \left\{ \begin{array}{l} 00 \\ 10 \\ 20 \end{array} \right\} \right]$

2. Control Card Number Two

The 1403 printer utilizes a paper tape loop in a manner similar to the way the paper tape loop is utilized by the printer on the 3301 system. The 1403 printer paper tape loop contains 12 columns which are referred to as channels. The hole which is punched in a given channel corresponds to a line on the page. The 1401 program may skip lines by executing a skip to channel instruction. Channel 1 is normally the first line printed on the page (top of page); channel 9 is normally utilized when printing summaries, totals, etc.; channel 12 is normally the line which is to be the last line printed on the page (bottom of page); only channel 9 and channel 12 can be sensed. In order that the line spacing on the 1403 printer be handled properly, it is necessary that the line punches for channels 1 through 12 be specified.

Control card number two is required for each 1401 program being simulated.

Cols. 1 - 2 Two digits indicating the number of 1401 printer vertical spacing lines from the top of the page to printer carriage control tape channel #1. (A similar description pertains to subsequent tape channel references.)

2. Control Card Number Two (Cont'd)

NOTE: "Top of the page" is the vertical position of the page as specified by 2¹ channel of the 3301 Printer tape loop (see section X of 3301 Systems Reference Manual). It is recommended that 1401 channel 1 be considered as "top of page" and specified as 00; then subsequent channel numbers will represent the number of lines from channel 1.

Col. 3	Blank.
Cols. 4 - 5	Number of lines from 3301 channel 1 position to tape channel 2.
Col. 6	Blank.
Cols. 7 - 8	Number of lines from 3301 channel 1 position to tape channel 3.
Col. 9	Blank.
Cols. 10 - 11	Number of lines from 3301 channel 1 position to tape channel 4.
Col. 12	Blank.
Cols. 13 - 14	Number of lines from 3301 channel 1 position to tape channel 5.
Col. 15	Blank.
Col. 16 - 17	Number of lines from 3301 channel 1 position to tape channel 6.
Col. 18	Blank.
Cols. 19 - 20	Number of lines from 3301 channel 1 position to tape channel 7.
Col. 21	Blank.
Cols. 22 - 23	Number of lines from 3301 channel 1 position to tape channel 8.
Col. 24	Blank.
Cols. 25 - 26	Number of lines from 3301 channel 1 position to tape channel 9.
Col. 27	Blank.
Cols. 28 - 29	Number of lines from 3301 channel 1 position to tape channel 10.

2. Control Card Number Two (Cont'd)

Col. 30	Blank.
Cols. 31 - 32	Number of lines from 3301 channel 1 position to tape channel 11.
Col. 33	Blank.
Cols. 34 - 35	Number of lines from 3301 channel 1 position to tape channel 12.
Col. 36	Blank.
Cols. 37 - 46	3301 tape station assignments for simulated 1401 tapes. (See 1401 Tape Assignment.)
Col. 47	Blank.
Col. 48	Blank = dump <u>Simulator process</u> when DUMP option requested. Nonblank = do <u>not</u> dump Simulator process (1401 registers <u>will</u> be dumped).
Col. 49	Blank.
Col. 50	Blank = dump <u>1401 Memory</u> when DUMP option is requested. Nonblank = dump 1401 registers and <u>not</u> 1401 memory.
Col. 51	Blank.
Cols. 52 - 58	1401 Sense switches A, B, C, D, E, F, and G. All Sense switches must be indicated with an entry of either 0 or 1. 1 = Sense Switch On 0 = Sense Switch Off
Cols. 59 - 63	Blank.
Col. 64	1403 printer chain format $\left\{ \begin{array}{l} A \\ H \\ M \end{array} \right\}$ = A format, Business Symbols = H format, Scientific Symbols = "Naval Military" format (&'s or +'s printed as - 's)
Col. 65	Blank.

2. Control Card Number Two (Cont'd)

Col. 66 Blank = Simulator handles end of reel. The reel is rewound and another mounted in its place (reel is treated as if it is infinitely long).

Nonblank = 1401 handles end of reel (1401 counterpart for 3301 FCP).

Col. 67 Blank.

Cols. 68 - 70 $\left\{ \begin{array}{l} 04K \\ 08K \\ 12K \\ 16K \end{array} \right\}$ IBM memory size to be simulated

04K = 4K 1401 12K = 12K 1401

08K = 8K 1401 16K = 16K 1401

Col. 71 Blank.

Cols. 72 - 73 Number of lines to be printed per page.

Col. 74 Blank = normal card load simulation

T = execute tape load simulation

Col. 75 Blank.

Cols. 76 - 80 1401 program ID (will be typed out).

3. Control Card Number Three

This card is required for each 1401 program being simulated. This card contains the control information for Rerun/Restart memory dumps. These dumps are to a diagnostic device and will be ignored if a diagnostic device is not made available to the Simulator when required. These dumps may be controlled by the card reader, card punch, on-line printer, magnetic tape stations, digital clock, and by a console request. There are 15 possible ways to control these dumps, with no restriction on the manner of mixing the controls.

To indicate control is desired by a given device, the entry columns for that device will contain the number of reads, or writes, that are to be made before taking a dump. Whenever a tape is rewound, its block count is reset to zero. If control is by multireel data, a checkpoint may be bypassed when changing reels. The entry has a 0 appended as the least significant digit by the Simulator. (An entry of 000 indicates no control is desired from the device; an entry of 999 means to take a checkpoint after the block count becomes 990.)

3. Control Card Number Three (Cont'd)

Cols. 1 - 3	000 or control count for 1401 tape 0.
Col. 4	Blank.
Cols. 5 - 7	000 or control count for 1401 tape 1.
Col. 8	Blank.
Cols. 9 - 11	000 or control count for 1401 tape 2.
Col. 12	Blank.
Cols. 13 - 15	000 or control count for 1401 tape 3.
Col. 16	Blank.
Cols. 17 - 19	000 or control count for 1401 tape 4.
Col. 20	Blank.
Cols. 21 - 23	000 or control count for 1401 tape 5.
Col. 24	Blank.
Cols. 25 - 27	000 or control count for 1401 tape 6.
Col. 28	Blank.
Cols. 29 - 31	000 or control count for 1401 tape 7.
Col. 32	Blank.
Cols. 33 - 35	000 or control count for 1401 tape 8.
Col. 36	Blank.
Cols. 37 - 39	000 or control count for 1401 tape 9.
Col. 40	Blank.
Cols. 41 - 43	000 or control count for the card reader.
Col. 44	Blank.
Cols. 45 - 47	000 or control count for the card punch.
Col. 48	Blank.
Cols. 49 - 51	000 or control count for the printer.
Col. 52	Blank.

3. Control Card Number Three (Cont'd)

Cols. 53 - 62	Priming codes for 1401 tapes 0-9. The first column is the priming code entry for 1401 tape 0; the last column entry is the priming code for 1401 9. For a detailed explanation of priming codes, refer to the DEVPAR description of priming codes in Section VII of the REALCOM OPERATING SYSTEM MANUAL. <u>Unused positions must be 0's.</u>
Col. 63	Blank.
Cols. 64 - 73	The block count contained in the device region, of the file sequence to which the 1401 tape has been assigned, will be reset to 0, unless a 1 is entered in the column corresponding to the 1401 tape station number. If a 1 is entered, the block count accumulated from the previous job will remain unchanged. 1401 tapes 0-9 occupy the same relative columns as the priming code entry. These 10 columns <u>must</u> contain only 0 or 1. This entry will be 0000000000 if the programs are independent of each other or do not pass tapes from program to program without rewinding these tapes.
Col. 74	Blank.
Cols. 75 - 76	00 or any number of up to 59 indicate the elapsed time in minutes for clock checkpoint control.
Col. 77	Blank.
Cols. 78 - 80	To facilitate multiprogramming, this entry specifies the number of consecutive non-I/O 1401 instructions to be executed prior to executing a process interrupt (PIN 7). The Simulator may become process bound if there is a large number of 1401 instructions to be executed before coming to an I/O. It could require approximately 150 3301 instructions to simulate one 1401 instruction. By experimenting with different values for this entry, each programmer may determine the range of values which will provide the maximum throughput for the system. If an I/O is executed prior to the process interrupt, the Simulator will automatically execute a process interrupt after 200 consecutive non-I/O 1401 instructions.

F. BREAKPOINT SWITCHES

Three of the 3301 breakpoint switches are used by the 3301/1401 Simulator. Their functions are as follows:

F. BREAKPOINT SWITCHES (Cont'd)

Breakpoint Switch 2: Used in conjunction with the Simulator Control option LOOP and low-paper condition.

Breakpoint Switch 3: If on, the Simulator will print a trace of the 1401 instructions being executed. The format of the trace output is as follows:

L IIIF O AAAI BBBI D IIIB AA AF BB BF T XXXXC(AI)
XXXXXC(BI) XXXXC(AF) XXXX(BF) I_III_III_I

where:

- L - length of 1401 instruction.
- IIIF - final instruction register setting after the instruction has been staticized.
- O - 1401 instruction operating code.
- AAAI - initial A-register setting.
- D - 1401 instruction D modifier.
- IIIB - final instruction register setting after the instruction has been executed.
- AA AF - final A-register setting after execution.
- BB BF - final B-register setting after execution.
- T - "T" if 1401 control was transferred (instruction branched).
- XXXXXC(AI) - Initial contents of the A field before execution (10 characters). The right-hand end was the position addressed.
- XXXXXC(BI) - Initial contents of the B-field before execution (10 characters). The right-hand end was the position addressed.
- XXXXXC(AF) - Final contents of the A-field after execution (10 characters). The right-hand end was the position originally addressed.
- XXXXXC(BF) - Final contents of the B-field after execution (10 characters). The right-hand end was the position originally addressed.
- I_III_III_I - Original 1401 instruction staticized.

F. BREAKPOINT SWITCHES (Cont'd)

Breakpoint Switch #4: Used to interrupt simulation. Simulation will stop after the current 1401 instruction is processed.

G. SIMULATOR CONSOLE ROUTINES

The operator may select one of the Simulator Control options by typing in one of the following and pressing RELEASE:

C Continue simulation with next 1401 instruction to be executed.

Tnnnnn Transfer to 1401 location nnnnn. Simulation resumes at the specified 1401 instruction.

DUMP $\left[\begin{array}{c} _B \\ _N \\ _P \\ _S \\ _ - \\ _ - \end{array} \right]$ *A nondestructive memory dump is taken of both the 1401 memory and the 3301/1401 Simulator memory. At the completion of the memory dump, control returns to Simulator Control. The 1401 registers and last instruction executed will be displayed preceding the 1401 memory dump. Either one or both of the two dumps (the Simulator process and the 1401 memory) may be eliminated by options on the second control card; however, the 1401 registers and the last 1401 instruction executed will always be dumped. (C)

If the option is omitted or is $\left[_ _ \right]$, the dumps will be given according to the dump parameters on the control cards, or according to the settings of the last DUMP option executed. The following options may be used: (A)

B = Dump both Simulator process and 1401 memory and registers.

N = Dump neither the Simulator process nor 1401 memory... only the 1401 registers;

P = Dump only the 1401 memory and 1401 registers;

S = Dump only the Simulator process and 1401 registers. (A)

NOTE: If the operator forces a dump by transferring control to the Simulator dump location, both dumps will be given until reset by the next 1401 job.

*READY light will illuminate. Any one of the other options may now be performed.

G. SIMULATOR CONSOLE ROUTINES (Cont'd)

LOAD	Simulate a 1401 card load button, page eject on the printer, read a card, and resume simulation at the 1401 instruction at 1401 memory location 001.
INIT	Initialize a 1401 job. The next 1401 program is loaded from the card reader. (Control cards will be read.)
LOOP	*This option will suspend the Simulator and allow control to transfer to the 3301 Operating System. If a 3301 system "02 CONTINUE" is executed, control will return to Simulator Control if BP2 is off, or control will return to the suspension loop if BP2 is on. Control will be returned to the Simulator by turning BP2 off.
ppppppp	*Where ppppppp represents the settings of the seven 1401 switches A through G, either a 0 or 1. The switch is turned off by 0 and turned on by 1. The first character typed in is for Sense switch A, the second character for Sense switch B, etc.

*READY light will illuminate. Any one of the other options may now be performed.

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G. SIMULATOR CONSOLE ROUTINES (Cont'd)

Annnnn_XW *Alter the character located at 1401 location nnnnn.

X = character to be inserted:

W = word mark code (↑ = word mark present;
 = word not present).

Dnnnnn [-YY] *Display the character located at 1401 location nnnnn. The
 typeout will be: XW Where X = character and W = word mark
 code (see Annnnn_XW.

 If -YY is included, YY is the number of characters to be
 displayed, beginning with nnnnn as the leftmost character.
 The maximum number of characters that will be displayed is
 80.

SWA *Turn off the last card indicator which was set by the E/F
 card at the end of the previous 1401 deck. This must be
 done before a new 1401 data deck is to be processed by the
 1401 program already in memory. Otherwise, the Simulator
 will indicate that the last card switch is set the next time
 a Branch If Last Card instruction is executed.

BUFFER *Causes the next card read from the reader to be put into
 the Simulator read buffer. The next 1401 card read
 instruction will then access this card instead of the pre-
 vious card which was held in the buffer.

DSS *Display Sense Switches causes the current 1401 console
 switch settings to be displayed. Display is: SS_ppppppp,
 where ppppppp has the same meaning as is explained under
 the ppppppp option.

EXIT Causes the message 1401S_END_OF_SIMULATION; TIME HH:MM:SS
 to be typed out, the process terminated, and control returned
 to the Executive Control System (ECS).

EOF_n *Causes a simulated tape mark to be written to simulated
 1401 tape n (where n = 0, 1,, 9).

RDAREA *Causes the 1401 card read area to be typed out with its
 associated word marks.

TSET_n *Informs the Simulator that an unloaded tape has been re-
 loaded. This does not have to be done if new control cards
 are to be read.

RWD_n *Causes simulated 1401 tape n (where n = 0, 1, ..., 9) to
 be rewound.

*READY light will illuminate. Any one of the other options may be performed.

G. SIMULATOR CONSOLE ROUTINES (Cont'd)

RWU_n	*Causes simulated 1401 tape n (where n = 0, 1, ..., 9) to be rewound and an indicator to be set within the Simulator which indicates that the 1401 tape has been unloaded.
TLOAD	Causes the Simulator to simulate the function of the 1401 Tape Load button by reading a record into 1401 location 001 from simulated 1401 tape 1 and transferring to location 001.
CHKPNT	*A checkpoint dump will be made to a diagnostic tape provided the diagnostic tape has been opened. After the checkpoint, control will be returned to the next 1401 instruction to be executed, <u>unless BP4 is on</u> . If BP4 is on, control will be returned to Simulator control; then any of the other options may be performed.
RSS	Perform the RESET and START function on the 1401 console. This option will cancel the branching function if this halt is a 1401 Halt and Branch instruction. Control is returned to the 1401 instruction <u>following</u> the 1401 Halt and Branch instruction.
RDR_np [F]	*Exchange the card reader with the device assigned to DEVn. The n in this option is one of the device assignment characters for DEVn; with p as the priming code; the optional F is included to fill the card buffer area with the data from the first block on the interchanged device. The Simulator contains a card buffer area which allows the Simulator to be one card ahead of the 1401 program (a 1401 card read is actually a logical transfer of data from the card buffer area).

This option can be utilized in the following manner:

- (1) The 1401 program is read from the card reader.
- (2) All data has previously been transcribed to magnetic tape.
- (3) This option is used to interchange the card reader with the tape station containing the data.
- (4) The 1401 program is executed, reading from magnetic tape instead of from cards.

The 1401 program should contain a halt prior to reading the data, to facilitate this option. If the 1401 program requires a special card which precedes the data (such as a date card), this card is placed in the card reader as if the data were to follow. This card will be read and the information it contains will be in the card buffer area.

*READY light will illuminate. Any one of the other options may be performed.

G. SIMULATOR CONSOLE ROUTINES (Cont'd)

When the card reader is interchanged with the tape containing the data, the first read will access the card in the card buffer area, the second and succeeding card reads will access data from magnetic tape.

If there is no special card to precede the data, the optional F must be included in the request for this console routine. The F will cause a physical read from the interchanged device to fill the card buffer area. The first 1401 card read instruction will access the data from interchanged device instead of the data from the last card read.

RDR_ _ _ [F] *Cancel the reader interchange option and restore the original device. This option unconditionally primes the card reader in the binary mode if the card reader was the original device. The optional F is explained above.

PASS *Pass data on the device assigned to the reader until an E/F card is read.

*READY light will illuminate. Any one of the other options may be performed.

H. 3301/1401 SIMULATOR ERROR MESSAGES

Occasionally the Simulator will type out error messages. The messages and the corrective action is explained below.

MESSAGE	CONDITION	ACTION
INVALID. RE-TYPE	Simulator Control invalid type-in.	Re-type option and release.
INVALID 1401 MEMORY SIZE	Control card specifies 1401 memory size larger than what Simulator can allow.	Scratch job or (if can be corrected) correct card, replace in reader, type in C. to continue.
PUNCH READ FEED NOT BEING SIMULATED	Punch Read Feed cannot be simulated - Simulator will type out instruction error.	Scratch job - instruction <u>cannot</u> be Simulated.
WRITE-PUNCH READ FEED NOT BEING SIMULATED		
READER ERROR, REPLACE LAST CARD READ	Bad card read.	Correct card, replace in reader; type-in "C" to continue.
INVALID PRINTER CHAIN CODE	Control card contains invalid printer chain code.	Correct control card, replace in reader, type in C to continue.
1401 OPERAND TOO LONG	An operand exceeds a limitation of the Simulator (see "Limitations") - Simulator will type out instruction error.	Scratch job - instruction <u>cannot</u> be simulated.
1401 TAPE OPERATION NOT PERMITTED	Tape instruction <u>cannot</u> be simulated. Simulator will type out instruction error.	
1401 SIMULATOR CNTRL	Control has been released from the 3301 console routines back to Simulator Control.	Perform next Simulator Control option.
LOW PAPER; PAPER EJECTED	Simulator is about to start on a new page after recognizing low paper condition.	Replenish paper; turn off breakpoint 2; type C to continue and release.

H. 3301/1401 SIMULATOR ERROR MESSAGES (Cont'd)

MESSAGE	CONDITION	ACTION
NON-BCD TAPE SPECIFICATION TREATED AS BCD (NNN)	A non-BCD tape operation, i.e., binary or compressed tape, is being treated as BCD tape - nnn = 1401 tape address.	None - unless hangs or improper simulation - if so, scratch job - (operation cannot be simulated).
1401 TAPE NOT ASSIGNED	A 1401 tape (0-9) is being used which has not been assigned a 3301 tape station on the control card <u>or</u> specification on control card was not valid.	Correct Simulator control card and restart job.
INVALID 1401 TAPE NUMBER	An invalid 1401 tape drive number has been used (not 0-9) or unit address does not contain % or @. Tape operation cannot be simulated.	Scratch job - tape cannot be simulated as invalid tape address has been encountered.
TAPE On REWOUND. MOUNT FIRST REEL.	Tape drive n is rewound after executing rewind instruction.	Mount new tape if necessary; type in C to continue.
END OF REEL ON On. MOUNT NEXT REEL.	Tape drive n is rewound after end of reel.	Mount next tape; type in C to continue.
CONTROL CARD LINES/PAGE ERROR.	The line count per page in the control card is not numeric.	Correct control card; replace in reader; type in C to continue.
CONTROL CARD LINE COUNT ERROR	The line counts which indicate printer channel positions are not numeric or are three digits long.	
INDEXING ERROR.	Invalid indexing is specified in 1401 address. Simulator will type out instruction error.	Restart job. - This error may indicate that a card was misread.
UNALLOWED 1401 MEMORY SIZE	1401 memory size specified in first control card is not 04K, 08K, 12K, or 16K.	Correct card and type in C.
NOT RENAME OPTION	Possible keypunch error in the first control card.	
RENAME NAME IS INVALID	New process name may not be %%%% or spaces.	

H. 3301/1401 SIMULATOR ERROR MESSAGES (Cont'd)

MESSAGE	CONDITION	ACTION
NOT MEMORY SIZE OPTION	Control cards may be out of order or incorrectly punched.	Correct card and type in C.
REQUIRED MEMORY NOT AVAILABLE	The memory required for the desired 1401 memory simulation is unavailable, however, the memory required to handle smaller 1401 memory may be available to be allocated to the Simulator.	Change the first control card to simulate a smaller 1401 memory and type in C, or type in X to terminate the process.
CHECKPOINT CONTROL CARD INVALID	Nonnumeric character appears in a numeric field.	Correct control card and type in C.
CLOCK CHECKPOINT	Checkpoint dump occurs from clock control. Diagnostic tape must be open or else no dump will occur.	None.
DEVICE CHECKPOINT	Checkpoint dump occurs from device control. Diagnostic tape must be open or else no dump will occur.	
NO CLOCK ON SYSTEM	If the clock is supposed to be used, this is a warning message. The Simulator will continue running.	None if no clock is on system. If the clock is on the system and is to be used, terminate process and restart with clock running.
CLOCK INOPERABLE		
PRINT LINE SHIFTED XX	The lines printed on the printer will be shifted XX characters to the right.	None.
NOT PRINT LINE SHIFT	Invalid data in Print Line shift option.	Correct Card and type in C.
NO DEVICE CHECKPOINTS	Self-explanatory	None.
NO CLOCK CHECKPOINTS		
START TIME HH:MM:SS	The LOAD or TLOAD console routine has been initiated.	

H. 3301/1401 SIMULATOR ERROR MESSAGES (Cont'd)

MESSAGE	CONDITION	ACTION
.OTP HALT W	Nonrecoverable tape error occurred on tape write. This may not actually be an error. This halt will occur if the 1401 program writes a single character (not an E/F or E/D) or a short block.	Type in 02 (process ID) to ignore error.
.OTP HLT R	Nonrecoverable tape error occurred on tape read. The circumstances are the same as for .OTP HLT W.	Type in 02_(process ID) to ignore error and accept block as read.
.OTP HLT P	An erroneous logical record has been passed. The user is being informed of the passing of bad data (or tape), by the Simulator.	Type in 02_(process ID) to ignore error.
.OLO_PAPER	Low paper condition has been recognized.	Set breakpoint 2 on: type in "02_(process ID)" to continue. The Simulator will type a message for paper change <u>after the next page eject.</u> (See LOW PAPER-PAPER EJECTED message.) NOTE: This will <u>not</u> work if the 1401 program being simulated does not cause page change by a Skip to channel forms control instruction.
.OBAD_PNCH	Parity error detected on a punch.	Bad card has been selected into the reject hopper. Type in 02_(process ID) to continue simulation. There is no recovery from this error. This will usually indicate a rather serious punch problem.
RDR_OPTION_INVALID	RDR control option was invalid. Type out is followed by INVALID. Retype.	None. See next message.

I. SIMULATOR CARD-TO-TAPE AND 1401 JOB STACKING (STACK)

Console Typeouts	Cause	Action
CLOCK INOP	Digital clock is inoperable. (No halt occurs).	Render clock inoperable.
HH:MM:SS	Time display (HH hours, MM minutes; SS seconds).	None.
CONTROL CARD MISSING	Control card number one has not been read.	Correct control card(s).
INVALID 1401 MEMORY SIZE	Invalid data in control card one; 1401 memory size is not 04K, 08K, 12K, 16K; 1401 job requires memory larger than will be provided for this series of jobs.	Correct card or load next 1401 job.
THIS RENAME IS NOT PERMITTED.	Process may be renamed spaces or %%%%. 	Correct name.
SHIFT PRINT LINE ERROR	Invalid data in optional field.	Correct card.
INVALID CHANNEL DATA	Nonnumeric punch appears in numeric field or nonblank punch appears between numeric punches.	
INVALID CHARACTER	Self-explanatory. Review card punch format.	
READER_ERROR	Self-explanatory.	
LINE COUNT ERROR	Invalid printer line count	
INVALID CHECKPOINT CONTROL	Nonnumeric character in numeric field or nonblank character appears between numeric punches.	Typein desired parameter.
PARAMETERS [HH:MM:SS]	Operator response required.	
END OF FILE TRANSCRIBED	E/F card has been read and the E/F written to tape.	None.

J. TAPE TRANSLATOR (TRANS) ERROR MESSAGES

MESSAGE	MEANING	ACTION
UNRECOVERABLE_TAPE ERROR-RESTART	An unrecoverable tape error has occurred.	None. Tapes will rewind and computer will request new parameters.
EOF	EOF encountered while translating or positioning by block control.	None. EOF causes termination of operation and new parameters are requested.
nnnnnn_RECORDS_ TRANSLATED.	nnnnnn records have been translated between EOF's or at end-of-block control operation.	None. Information only. Count indicates <u>logical</u> records only.
nnnnnn_RECORDS_ PASSED.	nnnnnn records have been passed before termination by an EOF when under block control.	None. Information Only.
CANCELLED.	Translation operation cancelled after reading a Simulator End of Reel.	None. Computer requests next parameter.
COUNT_DOUBLED.	Record count has been doubled for Simulator Load mode format positioning.	None. Information Only.
END_OF_REEL_WILL_ BE_HANDLED_BY:	Computer is requesting instructions on how to handle output tape end-of-reel condition.	Tape TRANS if Tape Translator is to handle; type USER_ if the programmer will handle EOR.
EOR	EOR encountered while translating or positioning.	Action depends on following messages typed out.
TM_HAS_BEEN_WRITTEN_ TO_IBM_TAPE_IN_LIEU_ OF_ED	The Translator has attempted to write an ED to a tape unit primed in the compatibility mode. An IBM tape mark (17g) has been written instead.	None. Message is a warning of what has been written to tape.
REQUIRED_MEMORY_NOT_ AVAILABLE	The memory required for the desired record size is unavailable, however, the memory required to handle a smaller record size may be available to be allocated to the Translator.	Type in C to allow request of smaller record size, or type in X to terminate the process.

J. TAPE TRANSLATOR (TRANS) ERROR MESSAGES (Cont'd)

MESSAGE	MEANING	ACTION
ABNRM TERMINATION_ DEVICE OX._CD CHARACTERS_ARE_XX.	The C and D characters (see Appendix D) define the abnormal termination.	Type in: C = to retry X = to terminate and restart.
END_OF_INPUT_TAPE._ MOUNT_NEXT_REEL._ TYPE_C_TO_CONTINUE; X_TO_TERMINATE.	End of simulator format <u>input</u> tape.	Type X to terminate or mount next reel to be translated and type C to continue.
END_OF_OUTPUT_TAPE_ MOUNT_NEXT_REEL._ TYPE_C_TO_CONTINUE	End of simulator format <u>output</u> tape.	Mount next scratch reel and type C to continue.
END_OF_TAPE_TRANS- LATION	End of job	None. Process terminates after rewinding tapes.
***_INSERT_PARAMETERS.	Parameter request.	Type in parameters and release.
INVALID._RE-TYPE	Parameters inserted were invalid.	Type in corrected parameters and release.
TERMINATED. MORE THAN 16,000 CHARACTERS. 12,000 8,000 4,000 1,000 500 200	Self-explanatory.	None. Tapes will rewind and process will terminate--input tape cannot be translated.
TERMINATED. RECORDS_ NOT_EQUAL_LENGTH	The two records representing the characters and the word marks respectively are not of equal length when input is from a Simulator format tape ("Load" mode)	
TERMINATED. RECORD_ TOO_LONG.	Record size exceeds specified number of characters in length.	
TERMINATED. TOO MANY CHAR'S_IN_RECORD.	More than the specified number of characters are in a record.	
TERMINATED. TOO MANY WM'S_IN_RECORD	More than one-half the allowed record size is word marks.	

APPENDIX M

FORTRAN TRANSLATOR OPERATING PROCEDURES

A. GENERAL

The Translator is a 301 FORTRAN II Program, and uses the I/O table locations specified in that system. Locations 0852-0857 have been set as follows for Translator input-output units:

0852 = 2 (work tape)
0853 = 3 (work tape)
0854 = 1 (FORTRAN translator tape)
0855 = X (card reader)
0856 = Y (card punch)
0857 = Z (on-line printer)

Because the 3301 FORTRAN II System restricts the use of tape unit assignments 8 and 9 to paper tape, the use of actual tape station 8 and 9 is prohibited.

B. SYSTEM OPERATION

1. Mount the FORTRAN translator tape and the two work tapes.
2. Place the input in the card reader and ready the card punch, or mount the input and/or output tape(s) if desired in place of the card reader, punch and/or printer.
3. Depress the LOAD CONSOLE button.
4. Type 4n00006999.. (where n = the trunk number of the translator tape).
5. Depress the RELEASE button.
6. When the computer halts, depress GEN RES.
7. If it is desired to change the standard I/O table locations at 0852-0857, do the following. (Otherwise go to step number 11.)
8. Depress the LOAD CONSOLE button.

Type N600190857

.._ _XXXXXX

where XXXXXX = the I/O device assignments to be moved into the I/O table.

9. Depress the RELEASE button.
10. When the computer halts, depress GEN RES.

B. SYSTEM OPERATION (Cont'd)

11. Depress the LOAD CONSOLE button.
12. Type V102195500
13. Depress the RELEASE button.
14. The statement * _ _ _ _ FINI terminates the Fortran translator. Processing may be continued by supplying more input, ending with another * _ _ _ _ FINI card, and depressing the START button.
15. Off-line tapes to be processed by the PDDUP routine should be terminated by the operator with an E/D.

C. MONITOR TYPEOUTS

Because the Translator was programmed in the 3301 FORTRAN II system, any abnormal condition will result in monitor controlled typeouts. For an explanation of these typeouts refer to the 3301 FORTRAN II Operating Procedures, Appendix J.

APPENDIX N

TAPE TRANSLATOR (TRANS)

©

Function

A difference exists between the IBM and RCA binary bit representation of characters. Because of this difference, there can be no passing of magnetic tape between IBM and RCA systems without first translating the characters from the octal code of the sending system to the octal code of the receiving system. The Tape Translator performs a character for character translation of IBM characters to the corresponding RCA characters, and also a character for character translation of RCA characters to the corresponding IBM characters. There is no reformatting of the data by this process.

Specifications

- A. This process will translate the following:
 - 1. 1401 Move mode format tape records into 3301/1401 Simulator Move mode format tape records.
 - 2. 3301/1401 Simulator Move mode format tape records into 1401 Move mode format tape records.
 - 3. 1401 Load mode format tape records into 3301/1401 Simulator Load mode format tape records.
 - 4. 3301/1401 Simulator Load mode format tape records into 1401 Load mode format tape records.
- B. Translation may be controlled by either a block count or by an End of File count.
- C. Tapes are rewound when the process first initializes and also when the process terminates.
- D. Tapes may be positioned forward by an End of File (EOF) count or a block (BLK) count and may be rewound to BTC.
- E. Additional parameters will be requested after an operation is completed unless that operation was an END operation which will cause termination of the process.
- F. The output tape may be positioned reverse one physical record by the BKSP option.
- G. An ED or End-of-Reel indicator may be written to the output tape by the EOR option.
- H. The programmer may let the Translator handle output End-of-Reel conditions or he may handle them himself.

Specifications (Cont'd)

- I. Reading of an "End-of-File" or a simulated "End-of-File" (EF) from the input tape will cause termination of an operation if that operation is under block count control.
- J. End-of-Reel will be indicated on the 3301/1401 Simulator format tape by an ED unless End-of-Reel is being handled by the programmer or the tape is primed in the compatibility mode.
- K. 1401 "End-of-Files" will be simulated by EF's.
- L. "End-of-Files" may be written to the output tape.
- M. The translation routines may be terminated by the operator if an end of reel is encountered on the Simulator format input tape.

Operating Procedures

- A. Type in:

01_RTRANSnp9B

where nn is the trunk number of the MLT and p is the priming code.

- B. There are no process parameters to be entered, therefore, the typeout:

ENTER PROCESS PARAMETERS

has a response of:

02

- C. Following the typeout for device assignment, the Tape Translator types out:

TRANS MAXIMUM RECORD SIZE IS:

The response is type in one of the following:

{	02H	where	02H = 200
	05H		05H = 500
	01K		01K = 1,000
	04K		04K = 4,000
	08K		08K = 8,000
	12K		12K = 12,000
	16K		16K = 16,000

- D. TRANS is loaded into the largest available block of memory. With the preceding typein the following is typed out:

TRANS TRANSLATOR HAS DE-ALLOCATED UNREQUIRED MEMORY

Operating Procedures (Cont'd)

- E. To facilitate the multiprogramming of the Tape Translator, the following typeout will occur:

TRANS RENAME PROCESS:

The reply is:

$\left\{ \begin{array}{c} \text{NO} \\ \text{name} \end{array} \right\}$

The name may not be five spaces or five percent signs (%%%). Any other five-character process identification is permitted. If the name is changed, all of the following typeouts will have TRANS replaced by the name which was entered as the new process identification.

- F. The next typeout is:

TRANS END OF REEL WILL BE HANDLED BY:

The response is:

$\left\{ \begin{array}{c} \text{USER} \\ \text{TRANS} \end{array} \right\}$

If the data is multireel, USER means that the 1401 program has the facilities to handle the tapes (Similar to FCP). TRANS means the Tape Translator is to treat the first reel as if it were infinitely long. (When the end of the reel is reached, a message will be typed out.)

- G. The next typeout is:

TRANS *** INSERT PARAMETERS

The response is any of the following parameters:

1. $\text{TRAN} _ \left\{ \begin{array}{c} \text{S-I} \\ \text{I-S} \end{array} \right\} _ \text{nnnn} _ \left\{ \begin{array}{c} \text{M} \\ \text{L} \end{array} \right\} _ \left\{ \begin{array}{c} \text{B} \\ \text{E} \end{array} \right\}$

TRAN - Required; indicates translation operation

I-S - Translate from 1401 format to Simulator format

S-I - Translate from Simulator format to 1401 format

nnnn - Count indicating number of blocks or EOF's to be used from the input tape to control the termination of the operation.

M - Indicates translation is to be done in the Move mode.

L - Indicates translation is to be done in the Load mode.

B - Indicates operation is to be controlled by block count.

E - Indicates operation is to be controlled by EOF count.

Operating Procedures (Cont'd)

$$2. \quad \text{POSI} - \left\{ \begin{array}{c} \text{I} \\ \text{O} \end{array} \right\} - \left\{ \begin{array}{c} \text{BTC} \\ \text{EOF} \\ \text{BLK} \end{array} \right\} - \left[\text{nnnn} \right] - \left[\text{X} \right]$$

POSI - Indicates positioning operation

I - Input tape to be positioned

O - Output tape to be positioned

BTC - Rewind to BTC

EOF - Read forward under EOF count control

BLK - Read forward under block count control

nnnn - Count indicating the number of blocks (BLK) or end of files (EOF) to be used to control the termination of the operation.

X - Required if positioning by block and tape to be positioned is in Simulator Load mode format.

3. EOF

EOF - Causes EOF to be written to the output tape.

4. END

END - Causes termination of the Tape Translation process and re-winding of the input and output tapes.

5. EOR

EOR - Causes ED to be written to the output tape to indicate End-of-Reel. (If the output tape is primed for the compatibility mode, a tape mark (TM) will be written instead.)

6. BKSP

BKSP - Causes the output tape to be positioned reverse (backspaced) one physical record.

7. LOOP

LOOP - Turn BP2 on before typing this parameter to suspend the process. To release suspension, turn BP2 off. The function of this parameter is the same as the LOOP option of the 3301/1401 Simulator.

Typeouts

MESSAGE	MEANING	ACTION
ABNRM TERMINATION_ DEVICE_OX._CD CHARACTERS_ARE_XX.	The C and D Characters (See Appendix D) define the abnormal termina- tion.	Type in: C = to retry X = to terminate and restart.
END_OF_INPUT_TAPE._ MOUNT_NEXT_REEL._ TYPE_C_TO_CONTINUE; X_TO_TERMINATE.	End of simulator format <u>Input</u> tape.	Type X to terminate or mount next reel to be translated and type C to continue.
END_OF_OUTPUT_TAPE_ MOUNT_NEXT_REEL._ TYPE_C_TO_CONTINUE	End of simulator format <u>Output</u> tape.	Mount next scratch reel and type C to continue.
END_OF_TAPE_TRANS- LATION	End of Job	None. Process terminates after rewinding tapes.
***_INSERT_ PARAMETERS.	Parameter request.	Type in parameters and release.
INVALID._RE-TYPE	Parameters inserted were invalid.	Type in corrected param- eters and release.
TERMINATED._MORE_ THAN_16,000_ CHARACTERS. 12,000 8,000 4,000 1,000 500 200	Self-explanatory.	None. Tapes will rewind and process will termin- ate--input tape cannot be translated.
TERMINATED._RECORDS_ NOT_EQUAL_LENGTH	The two records represen- ting the characters and the word marks respec- tively are not of equal length when input is from a Simulator format tape (Load mode)	
TERMINATED._RECORD_ TOO_LONG.	Record size exceeds specified number of char- acters in length.	
TERMINATED._TOO_ MANY_CHAR'S_IN_ RECORD.	More than the specified number of characters are in a record.	
TERMINATED._TOO_ MANY_WM'S_IN_RECORD	More than 1/2 the allowed record size is word marks.	

Typeouts (Cont'd)

MESSAGE	MEANING	ACTION
UNRECOVERABLE_TAPE ERROR-RESTART.	An unrecoverable tape error has occurred.	None. Tapes will rewind and computer will request new parameters.
EOF	EOF encountered while translating or position- ing by block control.	None. EOF causes termin- ation of operation and new parameters are requested.
nnnnnn_RECORDS_ TRANSLATED.	nnnnnn records have been translated between EOF's or at end of block con- trol operation.	None. Information Only. Count indicates <u>logical</u> records only.
nnnnnn_RECORDS_ PASSED.	nnnnnn records have been passed before termina- tion by an EOF when under block control.	None. Information Only.
CANCELLED.	Translation operation cancelled after reading a Simulator End-of-Reel.	None. Computer requests next parameter.
COUNT_DOUBLED.	Record count has been doubled for Simulator Load mode format positioning.	None. Information Only.
END_OF_REEL_WILL_ BE_HANDLED_BY:	Computer is requesting instructions on how to handle output tape End- of-Reel condition.	Type "TRANS" if Tape Trans- lator is to handle; type "USER_" if the operator (user) will handle EOR.
EOR	EOR encountered while translating or positioning.	Action depends on follow- ing messages typed out.
TM_HAS_BEEN_WRITTEN_ TO_IBM_TAPE_IN_LIEU_ OF_ED	The Translator has attempted to write an ED to a tape unit primed in the compatibility mode. An IBM tape mark (17 ₈) has been written instead.	None. Message is a warn- ing of what has been written to tape.
REQUIRED_MEMORY_NOT_ AVAILABLE	The memory required for the desired record size is unavailable, however, the memory required to handle a smaller record size may be available to be allocated to the Translator.	Type in C to allow request of smaller record size, or type in X to terminate the process.

APPENDIX O

TASK PROCESSING

Task Processing is the term applied to the linking of processes. The following points should be noted in regard to 3301 Task Processing:

1. One process will enter another directly; i.e. the Initiate console routine is not required and neither will it be typed by the Operating System.
2. The memory assignment typeout associated with each process will be typed out.
3. "Enter Process Parameters" typeout and "Enter Drum Parameters" typeout will follow rules of each individual process. (See 6-a below.)
4. The rules for device assignment typeout suppression remain unchanged for a process when it is incorporated into a task.
5. The task ID will not be appended to any typeouts. Some confusion could result if a process is simultaneously used as part of a task and also as an independent process. This problem can be overcome by carrying such a process twice under different names.
6. Some of the options of the initiate message carry through to all processes of a task:
 - a. Third character
 - sp - each process determines whether or not a stop for process parameters will occur.
 - P - the operating system will allow an opportunity for process parameters and segment 1 patches for all processes of the task.
 - S - the operating system will provide the opportunity for process parameters and patches to every segment of all processes in the task.
 - b. Thirteenth Character (Type of Memory Assignment)

Options 7, 8, and 9

Allocation of each process of a task is made starting from the same end of memory at which the task was initiated.

Only one task is permitted in memory at one time. When a task is to be used in a multiprogramming environment, the following points should be noted:

- 1) Any processes coexisting with the task must be loaded at the opposite end of memory from the task. This means that if the task is loaded with option 9, any coexisting processes must be loaded with option 7 or 8 and vice versa.
- 2) If the 301 Compatibility Package is terminated when a task is in operation, the remaining processes of the task will not occupy the area reserved originally for 301 programs (10K, 20K, or 40K).
- 3) The operating system will not allow remaining processes of the task to occupy area vacated by the Compatibility Package itself.

c. Fourteenth character

- A - All processes of the task will be treated as a real-time process and be given the proper priority.
- B - All processes of the task will be considered as general processes.

d. Fifteenth character

- There are three possibilities for a given process:

1. all segments on tape,
2. all segments on drum, or
3. segment one on tape and all remaining segments on drum.

7. The only console routines that refer directly to the task name are the 01 (Initiate) and the 06 (Display Environment) routines. The others, including 03 (Terminate), refer only to the current process of the task.
8. The DEVDIS feature of task processing allows the user to pass devices from the vacating process to the incoming process. A passed device does not necessarily have to contain information that is to be passed; for example, work tapes may be passed from one process to another.

For suppression of device assignment typeouts in task processing, each process is handled according to process level rules, except that any process in a task having one or more devices passed to it will have all its device assignments typed out.

If device assignments are typed out, the passed devices will be reflected in the typeouts. The typeout will be recognized by an L-- where the actual or logical number usually appears, for example:

C011A 0101 L AD03 5810

SIMULATOR CARD-TO-TAPE AND 1401 JOB STACKING (STACK)

The 3301/1401 Simulator provides the installation with the ability to stack 1401 jobs. STACK provides the user with the ability to transcribe the 1401 control cards, program cards, and any data cards that may follow, to magnetic tape. The control cards are read in the Translate mode; everything else is read in the binary mode. DEVPAR's may not be transcribed to tape by STACK.

The normal order of card placement is to have a binary E/F card as the last to be read for each job. However, the 1401 program may expect an end-of-file card following the program, and also following the data. The E/F along with the requested console typein will allow the operator to do the following:

1. Transcribe the next 1401 job to tape.
2. Suspend the process.
3. Terminate the process.
4. Continue reading data.
5. Transcribe card data to tape.

Operating Procedures for STACK

This process is loaded in the normal manner by using the 01 console routine. There are no process parameters. Following device assignment, the time will be displayed. If there is no digital clock on the system, there will be no time displays. If the clock is inoperable, the time display is preceded by the following typeout:

CLOCK INOP

The time displays will be meaningless until the clock is rendered operable. The time displays are HH hours, MM minutes, and SS seconds.

STACK expects Simulator control cards one, two, and three as the first three cards read. All three cards are validated prior to being transcribed to tape. If any of the cards are invalid, a "C" typein will cause rereading and validation of the corrected card.

After the control cards have been transcribed to tape, the rest of the cards are read in the binary mode. After the E/F is transcribed, the parameter typeout will occur. If the E/F is the last card of the 1401 program, the "JOB" parameter will cause the 1401 program ID and card count (and time) to be displayed. If the E/F is not the end of the program, the "C" typein will continue the card transcription.

After the first 1401 program has been transcribed to tape, the "JOB" parameter will allow the next 1401 program to be transcribed. The program ID and card count (and time) for the 1401 program just transcribed will be displayed. The first control card is no longer required. The tape output is restricted to being a single reel. The Simulator has no facilities for handling

Operating Procedures for STACK (Cont'd)

multireel card reader input, therefore, this restriction must be made.

If the cards to be transcribed are data cards and not the 1401 program, the first card should be blank. Following the error typeout and the request for parameters, the operator types "DATA". The cards are read in the binary mode and transcribed to tape. The purpose of the blank card is to provide an invalid control card and provide a convenient method to access the options of this process.

If a read or write error occurs, the operator response of a "2" to the FCP error recovery typeout will cause the parameter request typeout to occur.

Parameters:

- C Continue card transcription (the next card will be read).
- EXIT Terminate this process.
- JOB Begin transcribing this 1401 program to tape.
- LOOP If BP2 is on, suspend the process.
- DATA Transcribe data cards to tape (no control cards are present).
If this is the first series of cards to be transcribed, the first card should be blank.

Typeouts

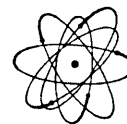
MESSAGE	CAUSE	ACTION
CLOCK INOP	Digital clock is inoperable. (No halt occurs).	Render clock operable.
HH:MM:SS	Time display (HH hours, MM minutes, SS seconds).	None.
CONTROL CARD MISSING	Control card number one has not been read.	Correct control card(s).
INVALID 1401 MEMORY SIZE	Invalid data in control card one; 1401 memory size is not 04K, 08K, 12K, 16K; 1401 program requires memory larger than will be provided for this series of instructions.	Correct card or load next 1401 instruction.
THIS RENAME IS NOT PERMITTED	Process may be renamed spaces or %%%%.	Correct name.

Typeouts (Cont'd)

MESSAGE	CAUSE	ACTION
SHIFT PRINT LINE ERROR	Invalid data in optional field.	Correct card.
INVALID CHANNEL DATA	Nonnumeric punch appears in numeric field or nonblank punch appears between numeric punches.	
INVALID CHARACTER	Self-explanatory. Review card punch format.	
READER_ERROR	Self-explanatory.	
LINE COUNT ERROR	Invalid Printer Line Count	
INVALID CHECKPOINT CONTROL	Nonnumeric character in numeric field or nonblank character appears between numeric punches.	
***PARAMETERS *** [HH:MM:SS]	Operator response required.	Type in desired parameter.
END OF FILE TRANSCRIBED	E/F card has been read and the E/F written to tape.	None.



EDP CUSTOMER BULLETIN



301 System

53

3/29/65

RCA 301 SYSTEM

MODEL 3485 TAPE STATION AND

MODEL 385, 3485 ADAPTER

This bulletin supersedes EDP Customer Bulletin #50 dated 10-8-64. The following change has been made:

The Model 385, 3485 Adapter, will operate in the BCD or Binary Mode only.

A Model 385 Adapter which will operate in both the RCA Mode and compatible Mode will not be available.

Prepared by:

Systems Information and Services
Electronic Data Processing
Radio Corporation of America
Camden 8, New Jersey

GENERAL DESCRIPTION

The Model 3485, Tape Station, is capable of reading 1/2 inch wide, 7-channel, magnetic polyester tape. The 3485 will accept tapes prepared BCD or Binary Mode. For example, tapes prepared on IBM 7330, 727, or 729 series tape units, may be read on the 3485. The 3485 will generate tapes that may be read by these IBM tape units. Consequently, the 3485 is completely tape and reel compatible with the IBM 7330, 727, and 729 tape units, and will accept standard IBM photo sensing markers (Load Point Indicator, End-of-Reel Indicator) as legitimate sentinels.

Tapes prepared on the 3485 can be read in the forward direction only. Tapes prepared on an IBM tape Station can be read in a forward direction only. Writing and erasing can be accomplished in the forward direction only. However, Read Reverse will cause a backspace operation. No data is transferred to HSM and no parity checking is performed.

The Model 385, 3485 Adapter, enables the 361 Processors to communicate with an RCA 3485 Tape Station. (Operation in the RCA Mode is not possible with this Adapter). The 385 Adapter may control a second tape station by the addition of a 1 x 2 switch (Special Feature 172).

Only one Model 385 Adapter per system is allowed.

The Adapter makes use of the Read-after-Write capability of the Model 3485 Tape Stations.

The Erase Tape feature allows a predetermined length of tape to be erased, consequently, bad tape may be skipped.

A tape mark symbol (17)8 is a legitimate block and when recognized will set the EF/ED indicator. This indicator is reset by the next Read Command.

Longitudinal parity is kept and the check character is generated when writing and validated when reading.

Either even or odd parity characters may be written to or read by the station under program control. Information is transferred to/from the station with no inversion or translation. Therefore, in the even parity mode, (00)₈ is not acceptable by the station.

The station will recognize ETW and set the ETW indicator. This indicator is reset when a Rewind instruction is staticized, or if the Rewind Button is depressed on the station when the station is in "Local".

SPECIFICATIONS - 3485 Tape Station

Reading and Writing Rate

- 30,000 characters per second.
- 83,400 characters per second.
- 120,000 characters per second.

SPECIFICATIONS - (Cont'd.)

Tape Speed (reading and writing)	- 150 inches per second
Tape Rewind Speed	- 300 inches per second
Recording density	- 200 cpi @ 30KC
	- 556 cpi @ 83.4KC
	- 800 cpi @ 120KC
Tape Width	- .500 inch + 0, - .004
Reel Dimensions	- 10.5 inch, outside diameter
	3.7 inch, Center Hole diameter
	Each reel accommodates 2400 feet of 1.5 mil tape.
Average Gap Size	- 0.75 inch can be read; 0.825 inch generated.
Timing (at all speeds):	
Up to Speed	- 3.5 milliseconds
Read to Write Up to Speed	- 15 milliseconds
Tape Positioned at BTC Up to Speed	- 35 milliseconds

DENSITY

A set of switches on the Adapter allow selection of 200, 556, or 800 bpi densities.

ERASE TAPE FEATURE

In order to bypass tape flaws that cause read-after-write errors, there is a programmed erase option. The erase tape feature is performed by using an I/O Sense instruction as a command followed by a TWN or TWS instruction. The A and B addresses of the Tape Write instruction must be consistent with the programming rules noted herein.

The length of tape erased will be equal to the amount of tape prescribed by the differences between the A&B addresses. No information will be transferred from HSM to tape.

DATA TRANSFER TO AND FROM HSM

Transfer of data to and from HSM is by diads. An odd or even number of characters may be transferred. However, data is always transferred starting at an even diad location in HSM regardless of the odd or even A address used. Transfer of data will be accomplished according to the following rules:

1. When writing an even number of characters, (A_i) will be assigned as an even numbered diad location and (B_i) will also be designated as an even diad location. After the transfer, (A_f) will be reflected as ($B_i + 2$) and (B_f) will be (B_i).

$$\begin{aligned}A_i &= \text{even} \\ B_i &= \text{even}\end{aligned}$$

$$\begin{aligned}A_f &= B_i + 2 \\ B_f &= B_i\end{aligned}$$

The contents of the location designated by the instruction are transferred, whereby, $(B_i + 1)$ will be the last character transferred.

2. When writing an odd number of characters, (A_i) will be designated as an odd numbered diad location, and (B_i) will also be designated as an odd numbered diad location. After the message has been transferred, (A_f) will be reflected as $(B_i + 2)$, and (B_f) will be as (B_i) .

$$\begin{array}{ll} A_i = \text{odd} & A_f = B_i + 2 \\ B_i = \text{odd} & B_f = B_i \end{array}$$

The contents of $(A_i - 1)$ will be the first character transferred. The Adapter will ignore the second half of the last diad and $(B_i - 1)$ is the last character of the message transferred.

3. When reading an even number of characters with the ABE terminate, the initial and final registers will be reflected as in item 1. However, the message will be transferred to the locations specified, where $(B_i + 1)$ will be the last character transferred. An odd number of characters can not be read with ABE terminate.
4. With gap terminate, an odd or even number of characters may be read. However, (A_i) must be designated as even, and (A_f) will then reflect $(A_i + N)$, where N is the number of characters transferred.

RECORDING MODE

The Model 385 will allow reading tapes produced on IBM 7330, 727, and 729 series tape units and writing tapes that can be read on these units.

The recording rate is 30KC, 83.4 KC, or 120KC odd or even parity as determined by the computer program. Since the bit configuration of the IBM Tape Code is different from RCA 301 Tape Code, program translation is necessary. The chart on page 5 indicates the IBM tape code (BCD) and how the characters will appear in 301 HSM.

When reading and writing, the longitudinal parity check character used in the IBM systems will be automatically checked and discarded (reading) or generated (writing).

The EOF (End of File) character is a single character block. When reading, this character $(17)_8$ will enter HSM and set the ED/EF indicator. Normally, the EOF character will be preceded by a $3/4$ " gap. However, some IBM systems generate a $3-3/4$ " gap preceding this character. When writing, a $3/4$ " gap will be generated preceding the EOF character. A $3-3/4$ " gap may be generated by use of the programmed erase option.

Errors on tape will be handled as follows:

Reading

1. If a read error occurs on the A Channel (weak signal), an error indicator is set which can be sensed by the program. An error of this type indicates that proper transfer of data has been made but that there is a degradation in the quality of the playback signal. The read instruction will go to completion.
2. If a read error occurs on both the A and B Channels (unacceptable signal), an error indicator is set which can be sensed by the program. Data transfer will terminate and the tape will run to gap.
3. If a block on tape is less than three characters or if it is a one character block which is not an EOF character, a CIG error is indicated. The tape will stop immediately and both the CIG indicator and the error indicator (A and B Channel) will be set.

Writing

1. During Read-after-Write, if an error occurs on the A Channel (weak signal), an error indicator is set which can be sensed by the program. An error of this type indicates that proper transfer of data has been made but that there is a degradation in the quality of the playback signal. The write will go to completion.
2. During Read-after-Write, if an error occurs on both the A and B Channels, the tape will stop immediately and an error indicator is set which can be sensed by the program.

IBM CODE (BCD) TRANSLATION CHART

IBM CHAR	IBM MAGNETIC TAPE CODE	301 MACHINE CODE	301 CHAR	IBM CHAR	IBM MAGNETIC TAPE CODE	301 MACHINE CODE	301 CHAR
	22222222				22222222		
.)	1111011	0111011	,	H	1111000	0111000	Y
[	0111100 ✓	1111100	%	I	0111001	1111001	Z
<	1111101	0111101	•	10	1101010	0101010	(EI)
#	1111110 ✓	0111110	=	J	0100001	1100001	J
&+	0111111 ✓	1111111	Not Used	K	0100010	1100010	K
\$	0110000 ✓	1110000	"	L	1100011	0100011	L
* *	0101011	1101011	\$	M	0100100	1100100	M
]	1101100	0101100	*	N	1100101	0100101	N
;	0101101 ✓	1101101	(ED)	O	1100110	0100110	O
Δ	0101110	1101110	(EF)	P	0100111	1100111	P
-	1101111 ✓	0101111	Not Used	Q	0101000	1101000	Q
/	1100000	0100000	-	R	1101001	0101001	R
x	0010001	1010001	A	+ RECORD MARK	1011010	0011010	+
Y	0011011	1011011	.	S	0010010	1010010	B
g	1011100 ✓	0011100	:	T	1010011	0010011	C
Y	0011101 ✓	1011101	:	U	0010100	1010100	D
✓	0011110 ✓	1011110	:	V	1010101	0010101	E
GROUP MARK	1011111	0011111	+0	W	1010110	0010110	F
✓	1010000	0010000	&	X	0010111	1010111	G
✓	1001011 ✓	0001011	#	x	0011000	1011000	H
✓	0001100 ✓	1001100	@	Z	1011001	0011001	I
✓	1001101	0001101	(	0	0001010	1001010	(space)
✓	1001110 ✓	0001110	)	1	1000001	0000001	1
✓	0001111	1001111	Not Used	2	1000010	0000010	2
?	0111010	1111010	(EB)	3	0000011	1000011	3
A	1110001	0110001	/	4	1000100	0000100	4
B	1110010	0110010	S	5	0000101	1000101	5
C	0110011	1110011	T	6	0000110	1000110	6
D	1110100	0110100	U	7	1000111	0000111	7
E	0110101	1110101	V	8	1001000	0001000	8
F	0110110	1110110	W	9	0001001	1001001	9
G	1110111	0110111	X				

When reading IBM prepared tapes, "noise blocks" will come into HSM. A "noise block" may be defined as information in a gap or skip area of a magnetic tape. On IBM systems, these "noise blocks" are discarded. The "noise block" will vary in length. Its size will be determined by the minimum block of the IBM system which produced the tape. The following chart depicts the various IBM systems and the maximum noise block size for each:

SYSTEM	NOISE BLOCK SIZE
705 III, 7080	Less than 11 characters
7040, 7044, 7090, 7094	Less than 13 characters
7070, 7072, 7074	Less than 3 words
1401, 1460, 1410, 7010	Less than 13 characters

4 TAPE READ FORWARD NORMAL (RFN)

Repeatable

General Description

This instruction brings a series of consecutive characters from magnetic tape into HSM. Transfer from tape begins with the first character following a gap and ends when the next gap is sensed or the specified HSM area is filled.

Format

Operation - 4

N -

Mode	First Unit	Second Unit
Binary	• (ISS)	%
BCD	EB	=

A Address - Address of the even diad HSM location that is to receive the first character read.

B Address - Address of the even diad HSM location which is to receive the last character read when reading an even number of characters.

Direction of Operation

Left to Right

Standard Location

STA (0212-0215)

Direction of Tape Motion

Forward

Outline of Operation

Initially this instruction sends a start signal to the input unit specified by the contents of the N register. When the tape station receives the signal, two characters are transferred to the input buffer and then to HSM. The contents of the A register are compared to the contents of the B register. The A register is incremented by two. If the comparison proved equal and a gap is passed, PRZ is set, and the instruction terminates. If the comparison proved equal and a gap is not passed, PRP is set and the instruction terminates. However, the tape movement continues to gap. If the comparison proved unequal and a gap was passed, PRN is set, and the instruction terminates. If the comparison proved unequal and a gap is not passed, the cycle is repeated.

An even number of characters may be read by using either ABE terminate or gap terminate.

An odd number of characters may be read by using gap terminate, only.

The A_i and B_i addresses must always be designated as even diad HSM locations when reading either an odd or even number of characters. A_i will always be the first location loaded in all reading operations.

When an even number of characters are read using ABE terminate $B_i + 1$ will be the last HSM location loaded.

If an EOF (17)₈ is read, the EF/ED Normal Indicator is set.

If ETW is passed, the ETW flip-flop is set.

Final Register Contents

When reading an even number of characters with ABE terminate.

$$(A)_f = (B)_i + 2$$

$$(B)_f = (B)_i$$

When reading an odd or even number of characters with gap terminate.

$$(A)_f = (A)_i + n \text{ where } n \text{ equals the number of characters read.}$$

$$(B)_f = (B)_i$$

PRI (Tape)

PRP - The A and B register are equal before a gap has been found on tape.

PRN - A gap has been found on tape and the A and B registers are unequal.

PRZ - The A and B registers are equal at the time a gap has been found on tape.

5 TAPE READ FORWARD SIMULTANEOUS (RFS)

General Description

This instruction brings a series of consecutive characters from magnetic tape into HSM. Transfer from tape begins with the first character following a gap and ends when the next gap is sensed or a specified HSM area is filled. This instruction is performed in the Simultaneous Mode.

Format

Operation - 5

N -

Mode	First Unit	Second Unit
Binary	• (ISS)	%
BCD	EB	=

A Address - Address of the even diad HSM location to receive the first character read.

B Address - Address of the even diad HSM location which is to receive the last character read when reading an even number of characters.

Direction of Operation

Left to right.

Direction of Tape Motion

Forward

Outline of Operation

Initially this instruction is staticized in the Normal Mode. If the Simultaneous Mode is free and the SMDI button is not on, the contents of the NOR, N, A and B registers are transferred to the SOR, M, S, and T registers. This instruction sends a start signal to the input unit specified by the contents of the M register. Two characters following a gap on tape are placed in the tape buffer and then to HSM. The contents of the S register are compared with the contents of the T register. The contents of the S register are incremented by two. If a gap is passed in sequence, the instruction terminates. If the comparison proved equal, and a gap is not passed, the instruction terminates, and tape movement continues to gap. If the comparison proved unequal and a gap is not passed, the cycle is repeated.

An even number of characters may be read by using either STE terminate or gap terminate.

An odd number of characters may be read by using gap terminate, only.

The A_i and B_i addresses must always be designated as even diad HSM locations when reading either an odd or even number of characters. A_i will always be the first HSM location loaded in all reading operations.

When an even number of characters are read using STE terminate $B_i + 1$ will be the last HSM location loaded.

If an EOF (17)₈ is read, the EF/ED Simultaneous Indicator is set.

If ETW is passed, the ETW flip-flop is set.

Final Register Contents

When reading an even number of characters with STE terminate.

$$(S)_f = (B)_i + 2$$

$$(T)_f = (B)_i$$

When reading an odd or even number of characters with gap terminate.

$$(S)_f = (A)_i + n \text{ where } n \text{ equals the number of characters read.}$$

$$(T)_f = (B)_i$$

8 TAPE WRITE NORMAL (TWN)

General Description

This instruction transfers a specified series of consecutive characters in HSM to a designated Tape Station.

Format

Operation - 8

N -

Mode	First Unit	Second Unit
Binary	• (ISS)	%
BCD	EB	=

A Address - Address of the even diad HSM location of the first character to be written when writing an even number of characters. Address of odd diad HSM location of the first character + 1 to be written when writing an odd number of characters.

B Address - Address of even diad HSM location of the last character - 1 to be written when writing an even number of characters. Address of odd diad HSM location of the last character + 1 to be written when writing an odd number of characters.

Direction of Operation

Left to right.

Tape Motion

Forward

Outline of Operation

Initially this instruction sends a start signal to the tape unit specified by the contents of the N register and operates in the following cycle:

The contents of the HSM location specified by the A register are transferred to the tape station specified by the N register. The contents of the A register are compared with the contents of the B register. The contents of the A register are incremented by two. If the comparison proved equal, the instruction terminates. If the comparison proved unequal, the cycle is repeated.

When an even number of characters is to be transferred A_i will be designated as an even numbered diad location and the last character transferred will be $B_i + 1$.

When an odd number of characters are to be written, $(A)_i$ will be designated as an odd numbered diad location. The control module is conditioned to write the contents of $(A)_i - 1$ as the first character. The second half of the last diad is ignored and $(B)_i - 1$ is the last character transferred. This method is required for writing the one character ED, EF or EOF record.

Final Register Contents

$$(A)_f = (B)_i + 2$$

$$(B)_f = (B)_i$$

9 TAPE WRITE SIMULTANEOUS (TWS)

General Description

This instruction transfers a specified series of consecutive characters in HSM to a designated Tape Station.

This instruction operates in the Simultaneous Mode.

Format

Operation - 9

N -

Mode	First Unit	Second Unit
Binary	• (ISS)	%
BCD	EB	=

A Address - Address of the even diad HSM location of the first character to be written when writing an even number of characters. Address of the odd diad HSM location of the first character + 1 to be written when writing an odd number of characters.

B Address - Address of the even diad HSM location of the last character - 1 to be written when writing an even number of characters. Address of the odd diad location for the last character + 1 to be written when writing an odd number of characters.

Direction of Operation

Left to right.

Tape Motion

Forward

Outline of Operation

Initially this instruction is staticized in the Normal Mode. If the Simultaneous Mode is free and the SMDI button is not on, the contents of the NOR, N, A and B registers are transferred to the SOR, M, S and T registers respectively, and this instruction is executed in the Simultaneous Mode. This instruction sends a start signal to the output unit specified by the contents of the M register and operates in the following cycle:

The contents of the HSM location specified by the S register are transferred to the tape station specified by the M register. The contents of the S register are compared with the contents of the T register. The contents of the S register are incremented by two. If the comparison proved equal, the instruction terminates. If the comparison proved unequal, the cycle is repeated.

When an even number of characters is to be transferred A_i will be designated as an even numbered diad location and the last character transferred will be $B_i + 1$.

When an odd number of characters are to be written, $(A)_i$ will be designated as an odd numbered diad location. The control module is conditioned to write the contents of $(A)_i - 1$ as the first character. The second half of the last diad is ignored and $(B)_i - 1$ is the last character transferred. This method is required for writing the one character ED, EF or EOF record.

Final Register Settings

$$(S)_f = (B)_i + 2$$

$$(T)_f = (B)_i$$

S INPUT-OUTPUT SENSE (IOS)

General Description

This instruction tests the desired status of the selected input-output device and chooses one of two sequences of instructions.

Format

Operation - S

N -

	First Unit	Second Unit
Option 1	• (ISS)	%
Option 2	EB	=

A Address - A_0 specifies the test(s) to be performed as follows:

Option 1

"1" Bit In	Numeric Equivalent	Tests
2^0	1	Is the station inoperable?
2^1	2	Is the tape in motion?
2^2	4	Has ETW been sensed?
2^3	8	Is the tape on BTC?
2^4	&	Is the tape rewinding?

Option 2

"1" Bit In	Numeric Equivalent	Tests
2^1	2	Has a read error or a read-after-write error been sensed on the A Channel?
2^2	4	Has a read error or a read-after-write error been sensed on the A & B Channel?
2^3	8	Has a CIG been detected?

A_1, A_2, A_3 - 000 (zero)

B Address - HSM location of the next instruction to be executed if the condition or conditions being tested are present.

Outline of Operation

The test(s) called for by the bits in A_0 are performed on the device selected by N. If any one of the conditions tested is present, the contents of the P register are transferred to STP and the contents of the B register are then transferred to the P register. If the tested condition is not present, the next instruction in sequence is executed.

Final Register Settings

$$(A)_f = (A)_i$$

$$(B)_f = (B)_i$$

Standard Location

STP (on transfer only)

; REWIND TO BTC (RWD)

General Description

This instruction causes a designated magnetic tape unit to be completely rewound. Once the operation has been initiated the rewind proceeds totally independent of the computer, not occupying the Normal, Simultaneous or Record File Mode. The computer, after initiating the rewind, is free to execute other instructions.

Format

Operation - ;

N -

Option	First Unit	Second Unit
Rewind to BTC	• (ISS)	%
Rewind to BTC and start unload	EB	=

A Address - 0000 (zero)

B Address - 0000 (zero)

Direction of Tape Motion

Reverse

Final Register Contents

After rewind is initiated, the registers are available for use by the next instruction.

6 TAPE READ REVERSE NORMAL (RRN)

General Description

This instruction will cause the selected tape unit to rewind one gap. No data is transferred to HSM and no parity checking is performed.

Format

Operation - 6

N -

Mode	First Unit	Second Unit
Binary	• (ISS)	%
BCD	EB	=

A Address - must be zeros (0000)

B Address - must be zeros (0000)

Direction of Tape Motion

Reverse

7 : TAPE READ REVERSE SIMULTANEOUS (RRS)

General Description

This instruction will cause the selected tape unit to rewind one gap. No data is transferred to HSM and no parity checking is performed. This instruction is executed in the Simultaneous Mode.

Format

Operation - 7

N -

Mode	First Unit	Second Unit
Binary	• (ISS)	%
BCD	EB	=

A Address - must be zeros (0000)

B Address - must be zeros (0000)

Direction of Tape Motion

Reverse

S INPUT-OUTPUT SENSE (ERASE TAPE FEATURE)

General Description

This instruction will set a flip-flop in the control module such that the next write instruction directed to the selected tape station will be an erase.

Format

Operation - S

N -

First Unit	Second Unit
EB	=

A Address - 0001

B Address - Must be zeros (0000)

Operation

The command is transferred to the control module selected by N and the instruction is terminated.

Final Register Contents

$$(A)_f = (A)_i$$

$$(B)_f = (B)_i$$

STANDARD SOFTWARE

There will be no RCA Standard Software produced for this equipment.